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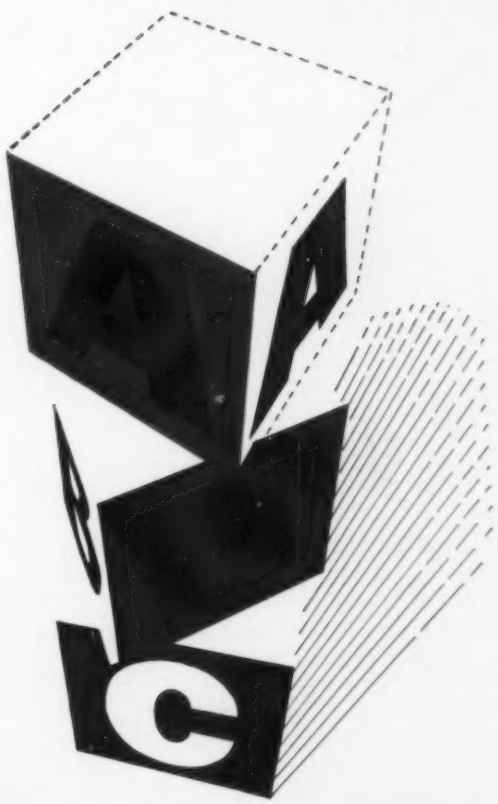

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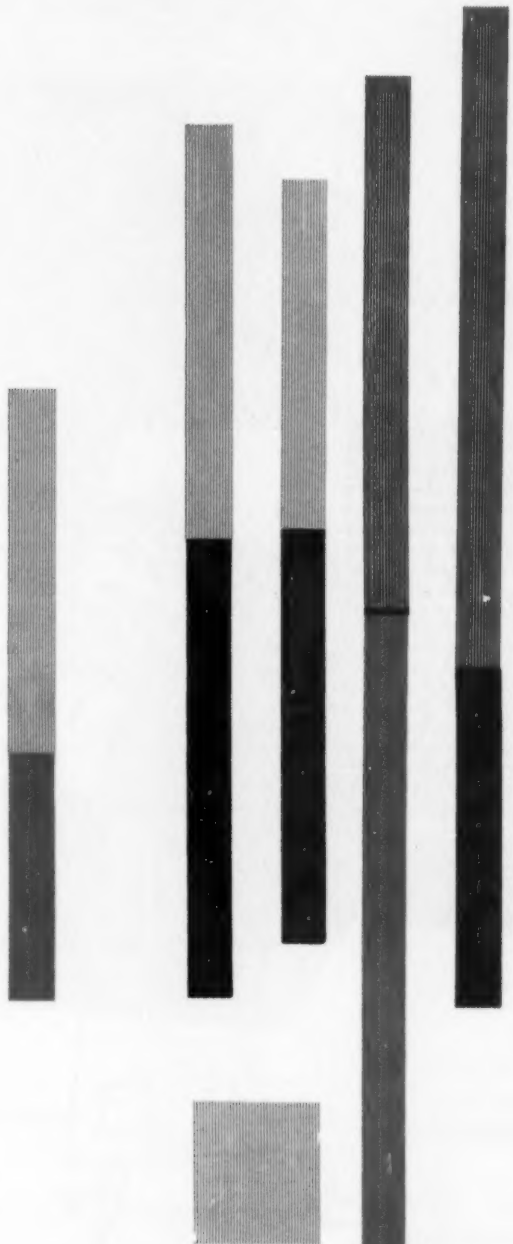

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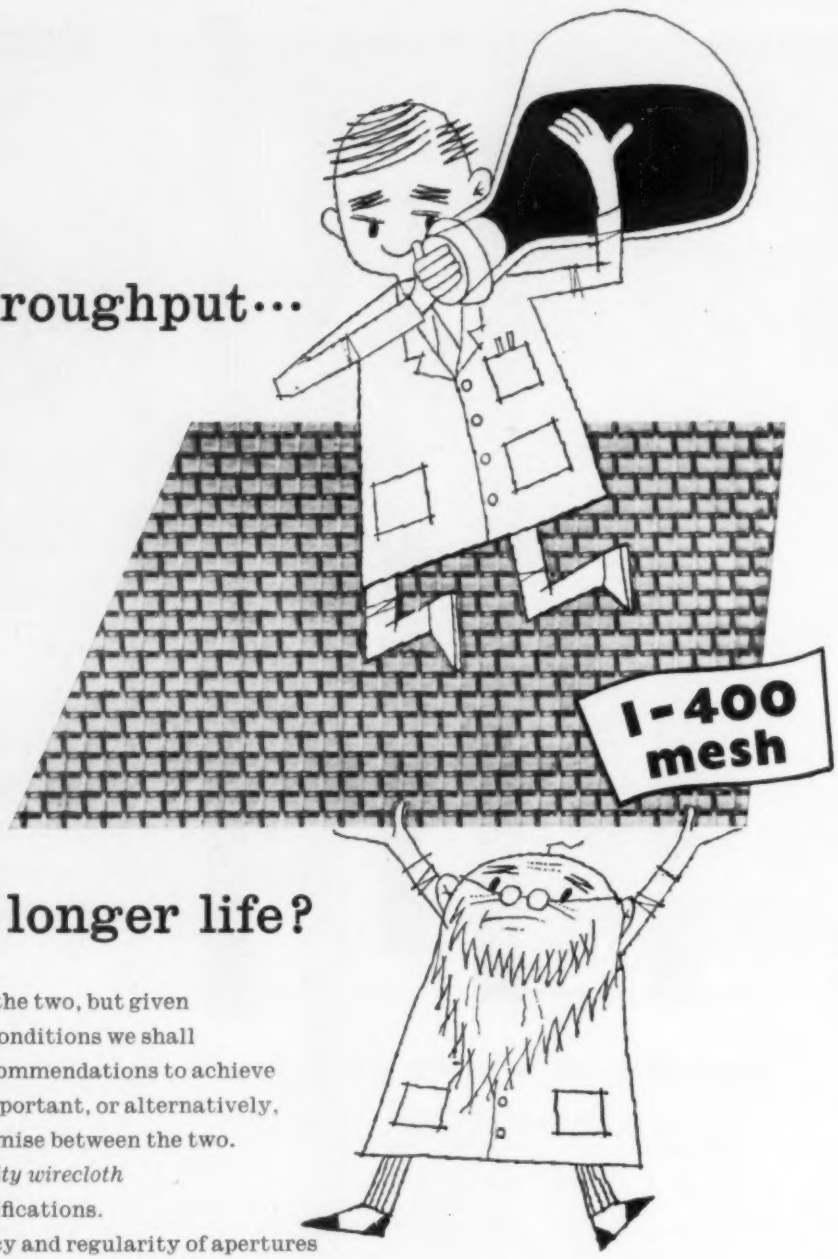

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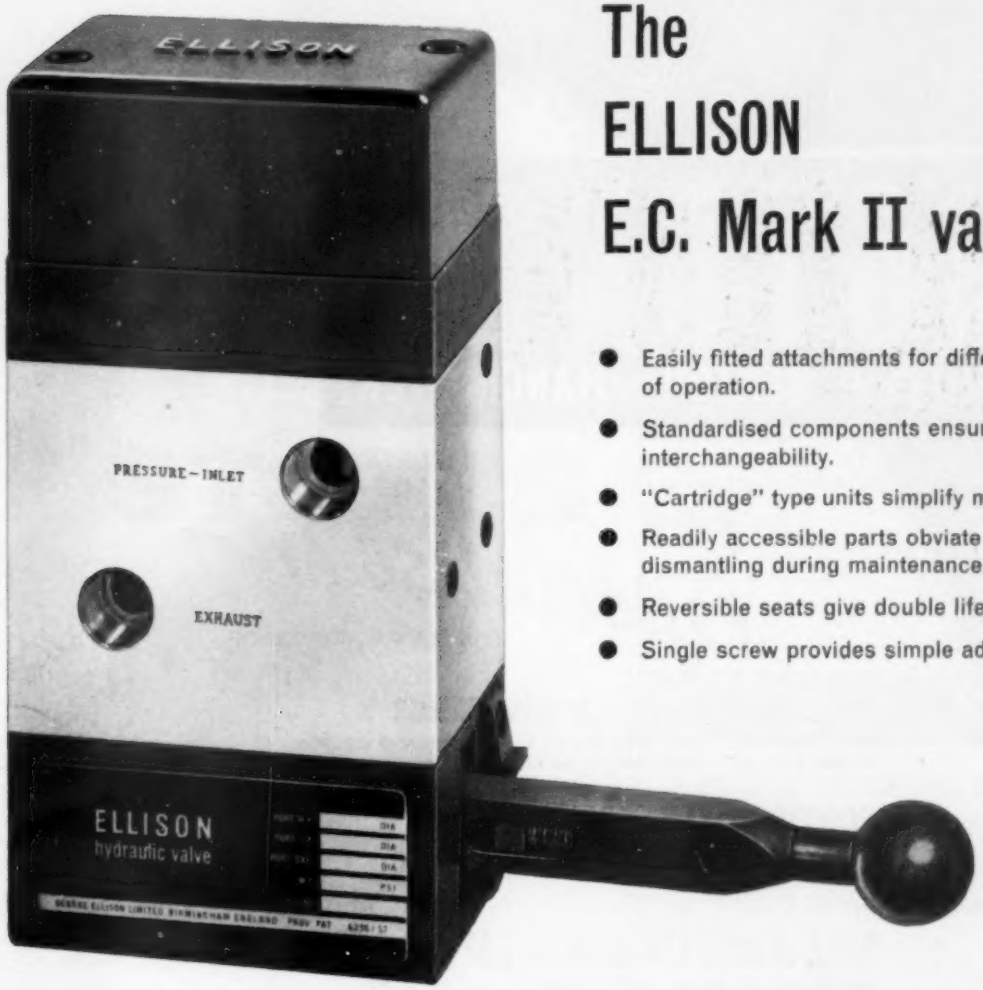

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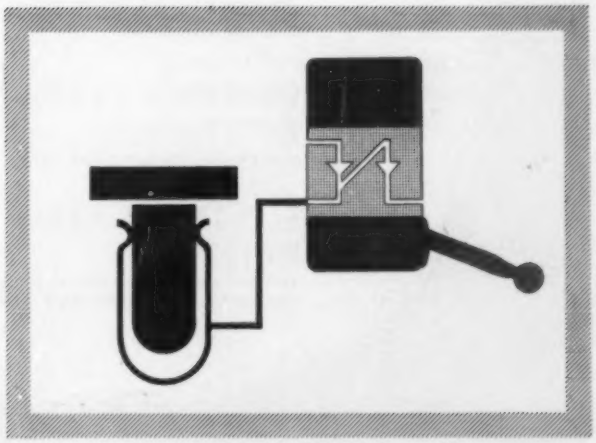

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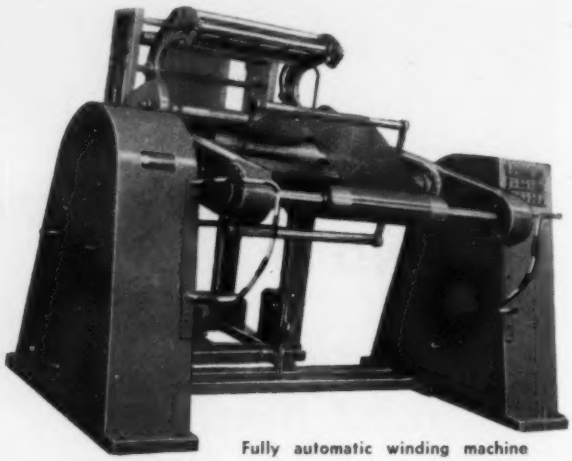

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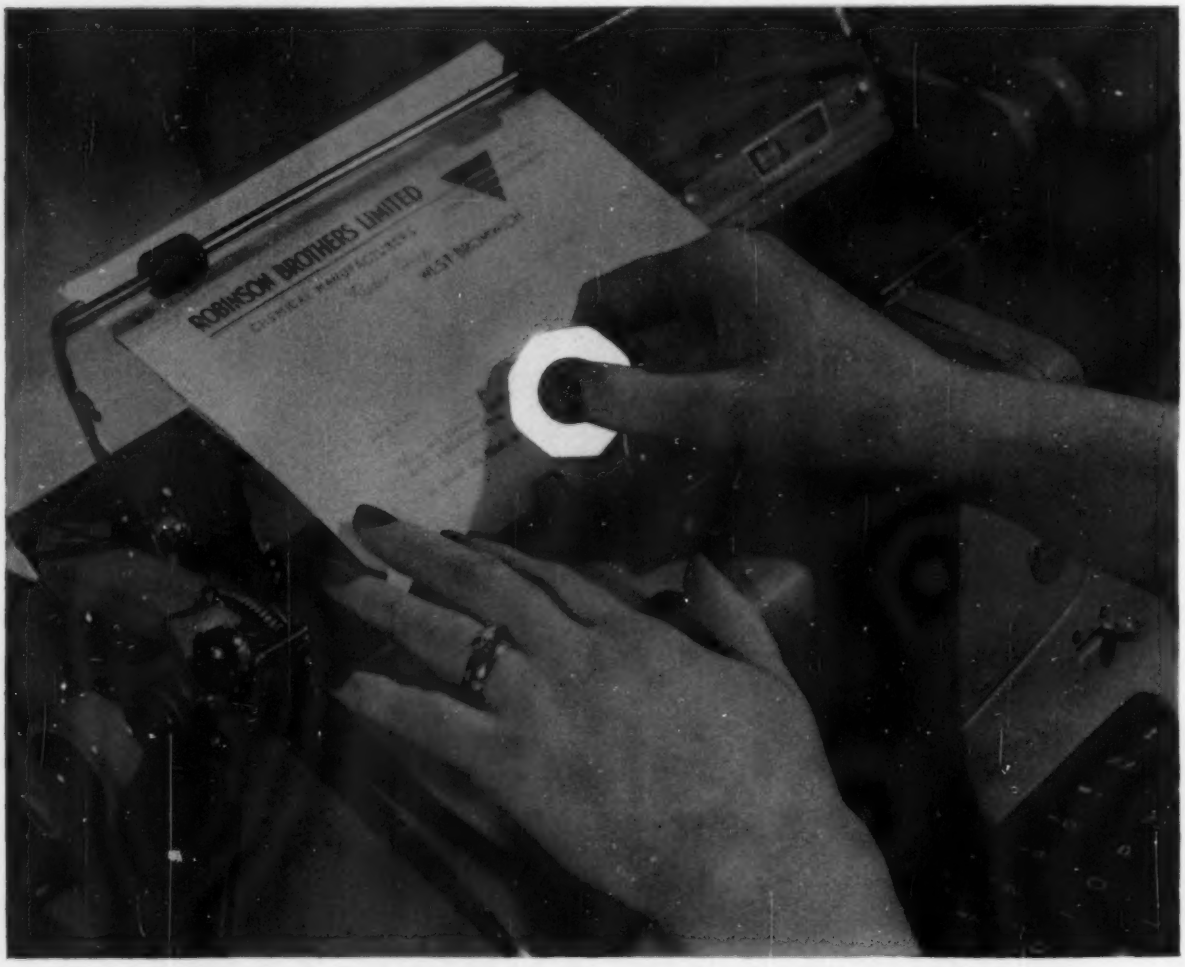

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IN ITS 76th YEAR

June 11 1960

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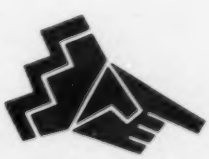

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NOTES of the WEEK

Research Progress

THE vital need to sustain the present acceleration of scientific and technical advance, and to balance progress between the needs of different industries and important problems affecting the nation as a whole, is stressed by the Council for Scientific and Industrial Research in their report for 1959 published last month. In an active year of steady expansion, 295 applications for research grants (out of 360) were awarded, totalling £2,232,000, more than double the previous year's. The breadth of research is remarkable, ranging as it does from nuclear physics to underwater geology; rubber to hydraulics. There is space for no more than one example.

Recently, the production of non-woven fabrics, useful for suit interlinings and carpet backings, has been increasing rapidly. Present production methods, however, have the disadvantage of requiring considerable quantities of binding materials to hold the fibres together. This gives poor drape and offsets the advantage of eliminating the spinning and weaving processes. To obtain an improved product, the fibres in the web must be arranged differently but whether this can be achieved depends on research into the properties of the fibres and adhesives. Three industrial firms (British Industrial Plastics Ltd., Textile Machinery Manufacturers Ltd., and Revertex Ltd.) and the DSIR (a grant of £5,000) are supporting basic research by Professor R. H. Peters, at the Manchester College of Science and Technology.

Technical Training

PLANS for Commonwealth Technical Training Week to be held throughout the United Kingdom from May 29 to June 4, 1961, at the suggestion of the Duke of Edinburgh, are now taking shape. Copies of a campaign guide have been issued to, among others, employers' organizations and every firm with 10 or more employees.

The booklet, 'Training Today for Tomorrow', contains a foreword from the Duke of Edinburgh and suggests some of the activities which might take place, such as open days in firms and colleges, and careers exhibitions. The aim of Commonwealth Technical Training Week, which will come at a time when the effects of the 'Bulge' will be rising to a peak, is to impress upon all sections of the community the importance of the education and training of young people for every kind of employment. This is an excellent and sound idea and a fine chance for our industries to 'show off' and also for the professional bodies to demonstrate how much they are doing in the field of education.

Profits as Capital

INCOME tax and super tax have to be paid, of course, on profits, but circumstances may arise where the tax cannot be levied, and in an interesting case which was made the subject of a test, the courts have defined the position when this applies. A company went into liquidation, and the assets included some undistributed profits. In accordance with the articles of association, part of these profits were then returned to the shareholders, and they were notified that they must pay tax thereon. The case for the Crown was, in brief, that a profit is a profit no matter what may be the ups and downs of the individual or trading concern that earned it. But against this it was argued that when a liquidator takes over control of a business, profit becomes capital and so cannot be assessed for tax; and in the result this view was accepted. It was shown that in certain cases income tax had been paid by the company on similar profits, but the court found that this did not affect the consistency of its ruling, inasmuch as the company had paid the tax as a taxpayer, and not as the agent of the shareholders.

Natural Price

THE view that natural rubber may not maintain its present price after the market has overcome its technical difficulties was expressed by Sir John Hay, chairman of United Sua Betong Rubber Estates, at the annual meeting on Wednesday. He went on to say that, thereafter, natural should remain at a highly profitable level for the remainder of the year.

An indefinite continuance of the present abnormal price would not, indeed, be desirable, he points out, since it would give a strong encouragement to the increased use of synthetics and other substitutes. Already it has resulted in a serious falling off in the demand for natural latex, the form in which the bulk of the company's output is processed.

Sir John Hay's remarks on the likely price level of natural are also interesting when taken in connection with the latest figures issued by the International Rubber Study Group. For the first three months of this year, production, at 477,500 tons, compared to a consumption total for the same period of 506,000 tons. In other words, consumption exceeded production by some 32,000 tons. Stocks at the end of March were also 2,500 tons lower than at the beginning of the year. Stocks of synthetic rubbers, on the other hand, at 327,000 tons—17,500 tons more than at the beginning of the year—emphasize the world increase in the use of these materials.

NEWS *Briefs*

MONSANTO AND SIDAC PROJECT IN BELGIUM MR K. VISITS I.C.I. PLASTICS—NEW CHEMICAL PLANT FIRMS—RUMANIAN 6-YEAR SBR PLAN

●**Belgium**—Formation is announced of a new company with headquarters in Brussels as a joint venture of Monsanto Chemical and the Société Industrielle de la Cellulose (SIDAC), S.A., of Belgium. The company will build a plant in Ghent to manufacture Monsanto's polyvinyl butyral plastic sheets. Construction will begin immediately, and the plant will be in operation in 1961. Monsanto, which has a majority interest in the new company, has been affiliated with SIDAC through a minority interest acquired in 1947, when SIDAC began to manufacture cellulose acetate sheeting using Monsanto's process.

●**Rumania** — Under the projected Rumanian Six-Year Plan for 1960-1965 it is intended to start up production of synthetic rubber with a target of 50,000 tons a year set for 1965, official Rumanian sources here report. No synthetic rubber was produced in Rumania last year. During the same period, production of tyres should rise 350% from 312,000 tyres in 1959 to 1,100,000 by 1965. The plan is to be discussed at the next party congress in Bucharest on June 20.

●**Argentine** — Casein production is declining slowly owing to drought conditions in pastures. Stocks are in the neighbourhood of 5,000 tons. Shipments during the week totalled 742 tons, comprising US 722 and Germany 20.

●**United Kingdom**—Sales from the Board of Trade's stock of natural in May totalled 1,672 tons, for delivery: spot 32 tons; June delivery 60 tons; July delivery 1,055 tons, and August delivery 525 tons. 52,297 tons of rubber remained available for sale on June 1.

●**United States** — US Rubber and Borden have scheduled a plant for the production of acetylene and of 150m. lb. of vinyl chloride a year. It is expected to be completed by 1962. The site has not yet been chosen.

●**Russia**—Mr Khrushchev, Communist Party and Government leaders visited the I.C.I. Plastics exhibition in Moscow (*RJIP* May 14, 738) which was formally opened on June 3 by the British Ambassador, Sir Patrick Reilly. The opening was attended by some 300 Soviet trade experts, scientists and specialists from the chemical industry.

●**United Kingdom**—Parsons Powergas, a new company for the engineering and construction of petrochemical plants, has been set up in London. Two concerns behind this enterprise are PG Engineering and the American company R. M. Parsons.

●**Australia** — The first plant in Australia to manufacture a complete range of industrial pigments will be established by Imperial Chemical Industries (ANZ) on a 330-acre site in the Melbourne suburb of Altona. The project will cost £A1.5m.

●**West Germany**—Vickers Ltd. and a German industrialist, Herr Hans J. Zimmer, of Frankfurt on Main, have formed a new company for plant design and engineering and construction for the chemical and man-made fibre industries. Vickers and Herr Zimmer hold an equal share in the new firm, Hans J. Zimmer Ltd. They will also hold equal shares in High Polymer and Petrochemical Engineering Ltd. of London.

●**Indonesia**—The Government is said to be planning to establish an agricultural commodity exchange later this year. This would have its headquarters in Djakarta and its branches in other regions. It would handle all Indonesian agricultural exports including rubber. The Indonesian Trade Minister is reported as saying that 'once the commodity exchange has been set up, every buyer must buy through the exchange.'

●**United States** — The division of rubber chemistry of the American Chemical Society is to sponsor a charter flight to Europe in October. Members of the society will attend the German rubber conference in Berlin (October 4-7), the plastics conference in Amsterdam (October 17-19) and the International Plastics Exhibition in Utrecht (October 17-26).

●**United Kingdom** — Colodense Ltd., a subsidiary of British Cellophane Ltd., has obtained, for the second successive year, the annual contract from the Iraq Date Trading Co. of Basra, for printed transparent cellulose film date wrappers. The contract is for wrappers printed in four colours on a special grade of film and is valued at about £14,000.

'New round here aren't you?'—488

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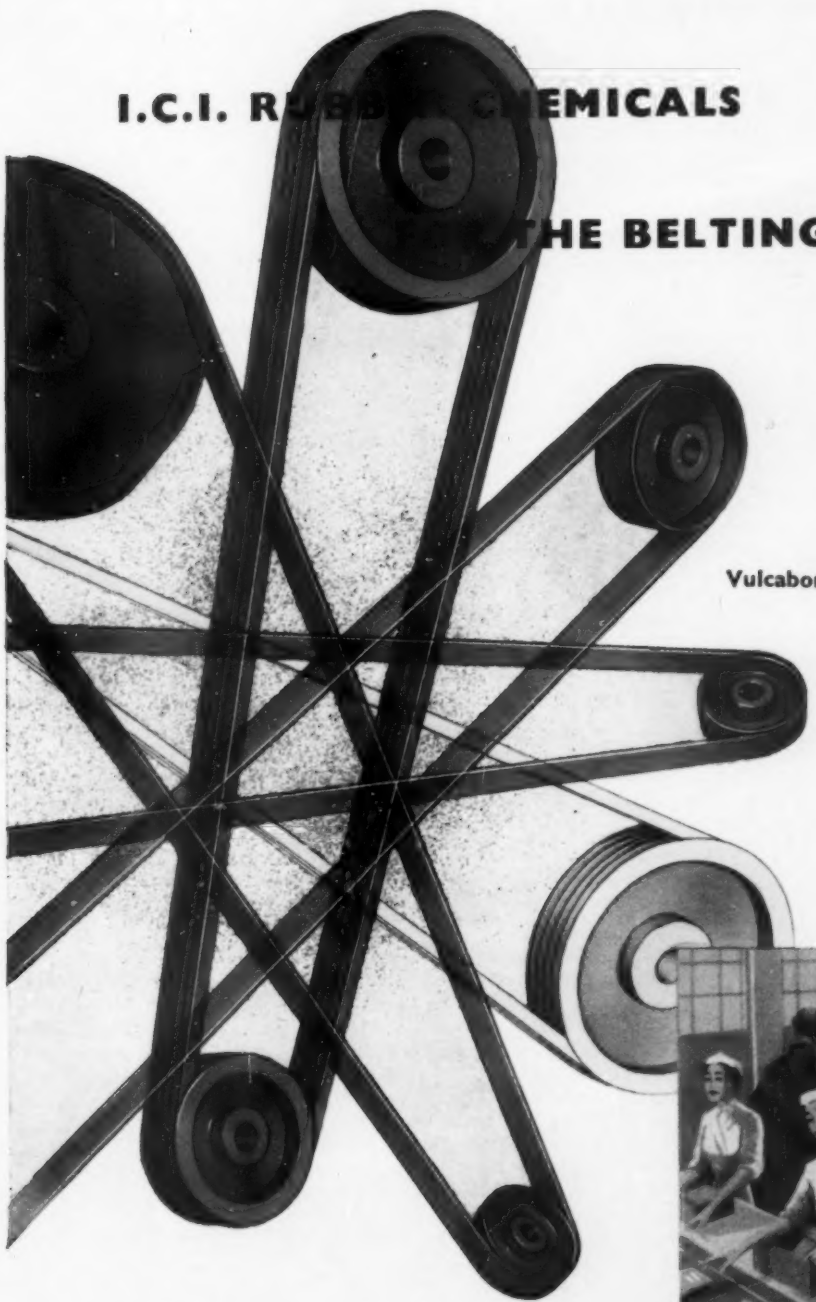

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New Acetic Acid Plant

DISTILLERS PLAN £2m. EXPANSION AT HULL

A NEW £2m. acetic acid plant is to be built at Hull by the chemicals division of Distillers, it was announced on June 7. It is expected to go on stream early in 1962.

The acetic acid, quantities of which are expected to be taken up by the rubber and plastics industries, will be manufactured by an entirely new process developed by Distillers. At present the company uses the conventional two-stage process based on ethyl alcohol; the new process will be a single-stage one depending on the direct oxidation of an unspecified light petroleum fraction. This means that the plant will be the first of its kind in Europe.

Further Expansion Possible

It is understood that acetic will continue to be manufactured by the company using the two-stage process. Part of the present output is used by Distillers in making a number of derivatives—but it is not known whether this field will increase with the increase in output.

A spokesman for the company did, however, say that additional space is available for expansion at a later date should this prove necessary.

£500,000 Test Track

The Department of Scientific and Industrial Research announce that a new road safety research track is being built at Crowthorne, Berks. The track will include a section with a special glass panel let into it. Photographic studies of the contact area of tyres will be made as vehicles pass over it. DSIR expect that this facility will help to extend the knowledge of the behaviour of tyres at the critical point of contact with the road surface, and the way in which this affects the skidding resistance of road surfaces.

The track will cost £500,000.

Philblack Price Down

The price of Philblack 'G' has been reduced. Ex-works Avonmouth, price is now 6¾d. per lb. for minimum of 3 ton lots, and 7¼d. per lb. for quantities less than this. Price ex-store (London, Glasgow and Elton, Bury) is 7¾d. per lb.

BAKER PERKINS BUY ROWNSON

Baker Perkins announce that negotiations have now been completed for the acquisition of Rownson (Conveyors) Ltd., of Yorks Way, London, N.7. This company manufactures a wide range of conveying and mechanical handling equipment and, Baker Perkins says, has been associated to an increasing extent during recent years in the supply of this type of equipment.

The purchase price of £95,000 will be met by the issue to the vendors on June 20 1960 of a sufficient number of ordinary £1 shares of Baker Perkins to yield this amount at the middle Stock Market price immediately prior to that date.

Rownsons employs about 200 people and will continue to operate as a separate company. This latest addition to the Baker Perkins group brings its total of companies in this country, USA, Canada, Germany, South America, Australia, New Zealand and South Africa to sixteen.

Research Shawby

The Research Association of British Rubber Manufacturers is now equipped with Telex. The number is 3534 and the 'answer back'—Research Shawby. For those member firms with Telex, and the number is increasing, this installation represents a valuable addition to Shawbury's already renowned service.

IRI HUMBERSIDE

Steps are being taken to set up a new section of the Institution of the Rubber Industry in the Humber area. At an inaugural meeting held at the Yarborough Hotel, New Holland, on May 26, a motion that a petition be placed before the council seeking formal approval to the formation of a Humberside Section, was carried unanimously.

A provisional committee was formed: T. Hall, chairman (J. H. Fenner and Co. Ltd., Hull); J. H. Cooper, secretary (John Bull Rubber Co. Ltd., Grimsby); F. Duerden, treasurer (John Bull); J. E. Gilroy (Reckitts (Colour) Ltd.); W. Cox (J. H. Fenner); G. Bedell (John Bull) and G. Harrison (John Bull).

Dunlop Division Moves

On June 1 the headquarters of Dunlop passenger transport division (formerly known as national sales division) moved from Albany Street, London, to Fort Dunlop. The company says that this is to bring the division into closer contact with the Dunlop Research, Technical and Production Divisions with the object of extending and improving the company's service to the passenger transport industry.

Record US Plastics Show

WHAT is said will be the biggest US plastics show will be held in New York City's Coliseum in June 1961. According to William T. Cruse, executive vice-president of the Society of The Plastics Industry Inc., advanced registration for the 9th National Plastics Exposition already has reached 209 companies, and more are expected to register before plans are much further underway. This number of registrations easily tops the advanced registration for the 8th National Plastics Exposition in Chicago in 1958 (168), and is well ahead of advanced registration for the last plastics show held in New York in June of 1956 (178), Mr Cruse reported.

The show is expected to draw more than 30,000 representatives from industry, business, retailing, government and education, who will see new products, materials and techniques dealing with all sides of the three billion dollar US plastics Industry. A technical conference now being planned will run concurrently with the show, which is scheduled for June 5-9 1961.

The Society of The Plastics Industry Inc., New York, now represents 1,150 companies and more than 2,400 individuals in USA and in 28 other countries. Chairman of the exposition committee is Robert F. Elder, President, Plax Corporation, Hartford, Conn.

Strike Threat to I.C.I.

Three weeks' strike notice was given to I.C.I. on June 7 by 1,000 workers. They are employed at seven of the company's works in Cheshire. A complete ban was placed on overtime.

The action is said to be in support of a claim for an increase in the basic wage rate. The men say that their basic wage of about £10 10s. a week is now below the national average and complain that negotiations between the company and the unions concerned are 'dilatory.'

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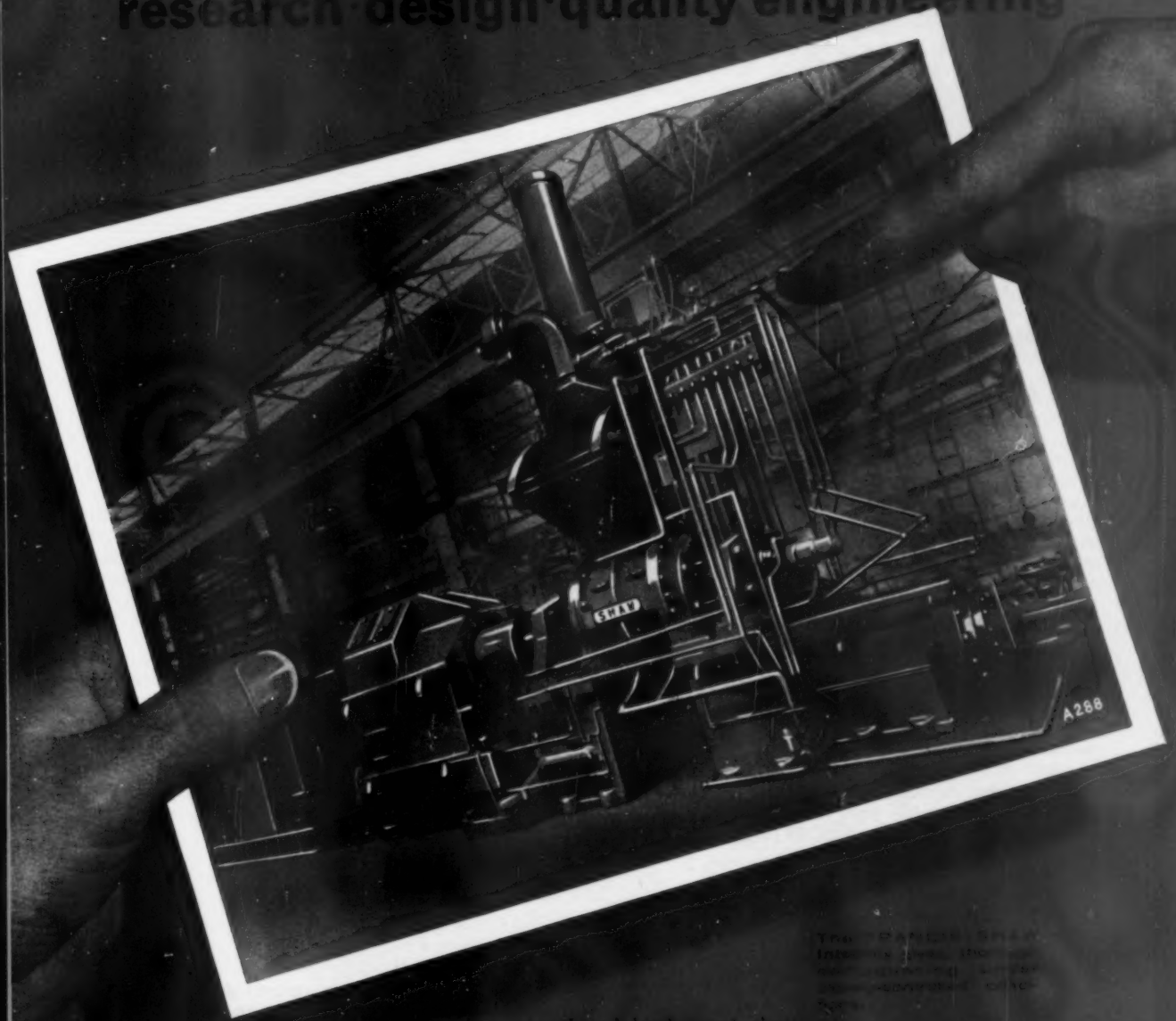

Francis Shaw

OVERSEAS AGENTS THROUGHOUT THE WORLD

Prospect for Polycarbonates

'GROUND FROST' OF COMMERCIAL INTRODUCTION

REVIEWING the prospects of the plastics industry in Germany, the 1958-59 OEEC report remarked upon the growing market in the utilization of polycarbonates. In the same year, the General Electric Co. in the USA listed 150 applications in which polycarbonates can show technical or commercial advantages. At the 1959 Dusseldorf Plastics Fair a number of polycarbonate applications were on show, such as machine guards, radio cabinets and business machines, described variously as exciting . . . of dubious value . . . or useless. Although the time is probably not yet here to pass judgment on this new material, polycarbonates have been firmly put on the map and the large capital invested in their development in Germany and USA will make sure that no possible sphere of ultilization is left unexplored.

Epoxides and polycarbonates share bisphenol-A as one of their constituents and the current expansion of bisphenol-A plants may well have an important bearing on the future of polycarbonate production. For example, in the USA, bisphenol-A plants are enlarged to produce 5m lb. per year for GEC at Mount Vernon, 25m lb. a year for Union Carbide at Marietta and a 50% increase for Monsanto at St. Louis. The pattern is similar in Germany. A large proportion of the bisphenol will obviously be taken up by epoxide manufacture, but the volume increase in epoxides forecast for the next few years would not account for all the augmented raw material plants going on stream this year and the next.

It is also necessary to consider that all present interest and investment has been generated by a material which is only now beginning to appear in commercial quantities in Germany and the USA and which is selling in this country for approximately 9s. 9d. per lb. Moreover, polycarbonates form a group of materials, and the currently appearing compounds are likely to be followed by others, tailored for specific requirements.

Production Processes

Polycarbonates, together with epoxides and alkyds, are members of the polyester family, although in contrast to the other two they are thermoplastic. They are formed by elimination polymerization between a diester of carbonic acid, such as diphenyl carbonate, and bisphenol-A, or 2:2-bis-*p*-hydroxyphenylpropane. Molecular weights in excess of 150,000 are found in the commercially available compounds, namely Bayer's Makrolon and GEC's Lexan. There are at present two types of viable commercial production processes.

In the ester exchange process, bisphenol-A and an excess over the theoretical amount of diphenyl carbonate react together in the presence of a basic catalyst at 200-230°C under 20-30mm.Hg. vacuum. To finish off the process, the temperature is raised to 290-300°C and the vacuum to 1mm.Hg. No solvent is required, and therefore no solvent reclamation plant, and the resin is obtained in a densified form. On the other hand, the high melt viscosity of the resin means that stirring becomes ineffective and the process has to be stopped before sufficiently high molecular weights are obtained: molecular weights are increased by processing on vacuum rolls. Altogether the stringency of high process temperatures coupled with vacua puts a considerable strain on equipment, especially since the smallest air leakage causes cross-linking, thus ruining the brew. A variation of the above process uses the bicarbonate ester of bisphenol as one of the monomers.

The second production process depends on the reaction:

$$n\left[HOC_6H_4.C(CH_3)_2.C_6H_4OH\right] + nCOCl_2 \rightarrow$$

bisphenol-A

$$\left[-OC_6H_4.C(CH_3)_2.C_6H_4OC(=O)-\right] + 2nHCl$$

polycarbonate unit

This means that for every polycarbonate unit, two molecules of hydrochloric acid have to be mopped up. Pyridine or a tertiary amine can be used for this, and at the same time can act as a solvent for the complete reaction. Unfortunately, pyridine and amines are costly, and so systems have been worked out so that a cheaper reaction solvent such as benzene, dioxane, trichlorethylene or a mixture of water and an inert solvent can be used; pyridine or tertiary amines are used only in quantities needed for their role as hydrochloride acceptors.

This process places no molecular weight limitation on the product and in addition equipment and production conditions are much simpler than in the first process. On the debit side, the polymer produced has to be densified by further processing, the hydrochloride acceptors are expensive and subsidiary plant for solvent recovery is essential. Both the ester exchange and the phosgene processes require the primary raw materials to be as pure as possible. Temperature and the concentration of reactants are the most important variables in each case and the success of production depends on their careful optimization.

Processing

Injection moulding and extrusion have been fully explored. Film extrusion and casting, together with fibre spinning—the latter aimed mainly at the tyre cord market—are still at various stages in the development pipeline.

For injection moulding, cylinder temperatures should be in the 220-300°C region, although higher temperatures have been used. Maximum pressures of up to 30,000lb./sq. ft. can be utilized and to counter high melt viscosities (sample: 4×10^3 poises at 572°C) moulds should be heated to 77-93°C; runners should be short and gates large.

Screws without water cooling, of L/D=15 : 1, giving a compression ratio of 1 : 2.4 are used for extrusion, with barrel temperatures in the range 232-288°C. For both injection moulding and for extrusion it is most important that the material should be completely moisture free; preheating to 110-125°C is a recommended procedure.

Properties

Polycarbonates have two outstanding properties: high impact strength of 12-16ft.lb./in. of notch on the Izod scale, compared with 1-4 for the polyamides and about 1 for a good quality industrial laminate, and temperature resistance of up to 149°C. These two, coupled with their dimen-

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sional stability of up to 138-143°C, low water absorption (0.3% by D570-ASTM) are the chief factors in the technical interest shown in them.

Tensile strength is approximately 10,000 psi and flexural strength about 18,000 psi. Polycarbonates show an elongation of 60-100% (D.638-ASTM), and they become brittle at −135°C. The electrical properties are good to very good: volume resistivity is 2.1 x 10^{16} ohm cm at 23°C at 50% humidity, dielectric strength 400 V/mil in an ¼in. thickness. The products are naturally transparent (58% light transmission for ¼in. thickness) and about as hard as polymethyl methacrylate (M.70, R118 Rockwell). They are self-extinguishing, exhibit mould shrinkage of 0.005-0.007in./in. and are claimed to have excellent machining characteristics.

Polycarbonates resist weak acids but are attacked slowly by strong and especially oxidizing acids. Similarly, they stand up to weak alkalis but succumb to strong ones. They are insoluble in aliphatic hydrocarbons, soluble in chlorinated hydrocarbons and certain ketones. They survive the domestic routine: tea, coffee, orange juice and tomato ketchup do not, claim the makers, have any deleterious effect.

Applications

At present there is no firm dividing line between actual and potential uses: there are several applications which may still be on the secret list in some development department and will become 'winners' in the future. Here are some that have already been tried out successfully.

Dimensional stability over a wide range of temperature and humidity and wear resistance make polycarbonates suitable for machine and clock components, car assembly features and camera parts. Obvious advantages can be obtained if parts which normally contain a number of separate metal components can be moulded from one piece. There is a general feeling that, in a number of cases, polycarbonates may be advantageously substituted for metal components.

The above qualities together with their electrical characteristics and transparency open up fields in the electrical industry: lampguards, fluorescent tubes operating at elevated temperatures, terminal blocks, armatures, switches, general insulators. In some of these applications they will probably replace the thermosets now in use. Their ability to resist stress and oxidation at high temperatures gives stimulus to their use as coil forms.

Creep resistance, good dimensional stability and easy machine-ability have already introduced polycarbonates into the production of business machine parts and covers, machine guards, electric apparatus covers and camera lens hoods. Their characteristic of deforming before breaking under violent impact may extend their use for crash helmets; their general chemical resistance makes them suitable for battery cases, containers and bottles; and their outstanding low temperature properties will no doubt be also fully utilized.

The largest single factor which determines whether a new development will survive the 'ground frost' of commercial introduction is its price, and polycarbonates will obviously have to meet this criterion. If production and competition increase the price will have to come down—to everybody's ultimate advantage. Assuming that this condition is fulfilled, and given the excellent technical potentials of this material the number of applications will increase, although the complete usage picture will have to be built up over the years as experience is accumulated in working with the material. In any case, Germany and the USA have certainly achieved a thorough widening of our present plastics horizon.

Dixie Price Cut

Anchor Chemical Company Ltd. announce that as from June 1 the price of Dixie 45 GPF carbon black has been reduced by ¼d. per lb. The range of prices now applicable is as follows: Minimum 3 tons lots 6⅞d. per lb. minimum 1 ton lots 7⅛d. per lb., ex works Swansea. Supplied ex store Manchester, London or Glasgow 7⅞d. per lb.

Fire Armour, London (manufacturers of fire appliances and sprinkler systems), has joined the George Angus group. It will continue to trade independently.

Turners Appointment

Mr A. S. Brack, who formerly held a senior position in the glass-fibre sales department of Turner Brothers Asbestos Co. Ltd., Rochdale, has been appointed plastics representative for Northern England. Mr Brack will specialize in Duraglas glass-fibre reinforcements and Durestos resinated asbestos moulding materials in those territories covered normally by the Manchester and Leeds Office Staff (*i.e.* North Wales, Lancashire, Cheshire, Yorkshire, Nottinghamshire, Lincolnshire, North Derbyshire).

More Durable Plasters

Romac have introduced nylon tyre plasters for motorcycle tyre covers. Made entirely from nylon and rubber, the plasters are only half the weight and thickness of standard ones. Disturbance of the tyre's balance is thus kept to a minimum. Romac say they are much more durable than ordinary plasters, due to the greater physical strength of the nylon cord.

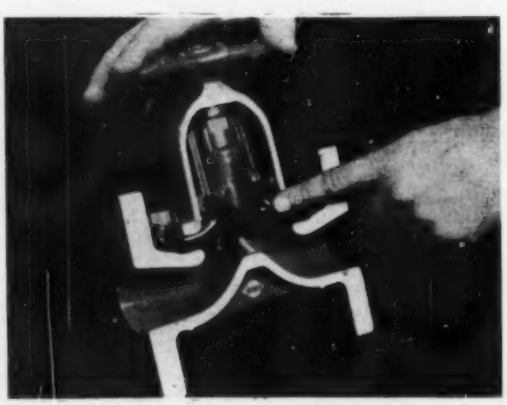
New Sutcliffe Director

D. M. Thompson has been appointed a director of the Sutcliffe Moulded Rubber Co. Ltd.

He has been with the company for twelve years, during the last ten of which he has been company secretary. He is a keen archer, a member of the Northern Counties Committee and has been connected with international archery since 1954.

Floor Covering

A vinyl floor covering in a wide variety of colour and pattern effects —23 initially—has been introduced by Marley Tile. Called Marleytred, it carries a felt backing and is being supplied-and-fixed as contract work, as well as sold in retail shops by the yard. The retail price is in the region of 16s. 9d. sq. yd.



The leading UK manufacturer of diaphragm valves, Saunders Valve Co. Ltd., of Cwmbran, South Wales, has pioneered and developed an entirely new use for 'Terylene'—as a reinforcement for diaphragms. Here a sectioned 'A' type Saunders diaphragm valve shows the 'Terylene' reinforcement, claimed to be stronger and last longer than other materials used for the same job

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French Plastics and Rubber Conference

THE 'Journées Françaises des Plastiques et du Caoutchouc' took place in Paris from May 16-19. The meeting was organized by the Society of Chemical Industry, the French Rubber Institute, the Research Laboratory of the French Rubber Industry, and the Centre for the Study of Plastic Materials. To quote Professor Leon Jacqué of the latter organization, what was intended to be a small domestic gathering turned out to be a meeting of much greater scope, with an attendance of about 350. Most of those taking part were from France, so, too, were the majority of those reading papers. There were, however, a number of visitors from other countries, but the only author from England was Mr M. R. Ceresa of the National College of Rubber Technology, who gave two papers on Mechanico-Chemical Reactions Leading to Reinforcement in Rubbers.

The programme was a full one, no fewer than 60 papers being read. These were divided into a number of simultaneous sections under the headings research, applications, and fabrication. These simultaneous sessions meant that it was impossible to hear all the papers or even those which seemed to be of particular interest. At some of the sessions, the audience consisted of a mere handful —half-a-dozen or less.

There were also five so-called plenary sessions at times when no other lectures were taking place. These were extremely variable both in quality and nature, ranging from the highly academic as exemplified by the first lecture which was given by Professor H. Benoit of Strasbourg ('Determination of the Structure of Co-polymers by Light Diffusion') to the extremely practical—such as a lecture by Mr P. Roesch on screw injection machines—a veritable catalogue with patent numbers of each and every screw injection machine from the beginning to the present day.

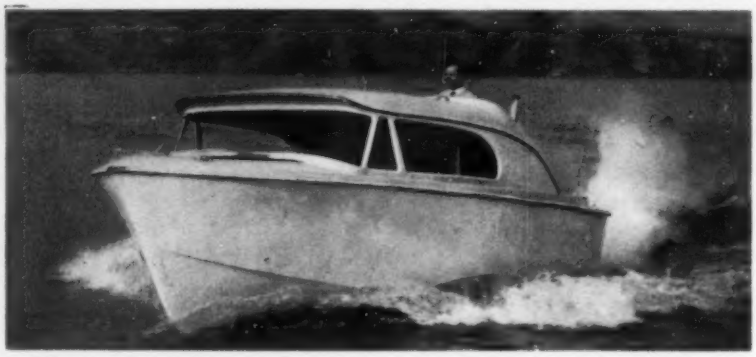
Those attending the conference had the opportunity of visiting either the French Rubber Institute, the Research Association of the French Rubber Manufacturers, or the Centre for the Study of Plastics Materials.

The Plastics Centre is organized in a curious manner, forming part of the School of Arts et Mentiers—a kind of trade school; scattered between circular saws, planing machines and other woodworking appliances the visitor may see an occasional press or extruder. However, good work in inadequate surroundings has obviously been done on the testing side. For example, a standard was set for the quality of phenolic mouldings, samples being purchased particularly from the multiple stores. When testing first began some years ago it was rare to have a sample which met the specification. Now it is rare to find a failure.

Abstracts of some of the papers read at this conference will appear in later issues of *RJIP*.

Boat Uses Big New Epoxide Mould

PALMERS Reinforced Plastics Ltd. (Savile Works, New Beckenham, Kent), a member of the Thomas Tilling Group, have introduced a new all-reinforced-plastics 20ft. two-berth cabin cruiser made from glass fibre reinforced Bakelite polyester resin. The hull is produced in one piece by spraying glass fibre and polyester resin on the inside of a mould based on Bakelite epoxide resin. With a moulding surface of just over 430 sq. ft., this mould is claimed to be one of the largest yet produced and, although initially more expensive than the more usual polyester mould, its extremely hard, smooth surface enables it to be used in the production of a very large number of hulls.



To make the epoxide mould, a wooden hull was first built to the required design which was then used as a pattern for the production of a one-piece 'female' mould, made from fibrous plaster, inside which a reinforced polyester hull was laid up by the normal hand lay-up technique. This hull was allowed to remain in the mould until fully cured and the plaster then broken away.

This first polyester resin hull was then braced internally and underwent a series of rubbing-down and filling operations until the external surface was completely free from blemishes. To achieve the best possible finish, the surface was given a final coat of a polyurethane preparation. The epoxide mould was laid-up by hand on the outside of the polyester hull—the gel coat being filled with a finely ground slate powder to give a high degree of surface hardness. Mould rigidity coupled with lightness were obtained by the application of a layer of Microballoon phenolic spheres mixed with epoxide resin, and the mould finished off by application of a suitable glass cloth reinforcement. A metal cradle was bonded into position on the mould before its removal from the die.

The decking, cabin top and superstructure are made in large sections from glass fibre reinforced polyester.

Jenolite Act for M and C

Jenolite Ltd. 13/17 Rathbone Street, W.1, have been appointed sole importers and distributors of the range of products of Minerals and Chemicals Corp., Menlo Park, New Jersey, USA. The products include aluminium silicate pigments and attapulgus clay products.

The Gillingham works of Novadel Ltd. will be closed for holidays from August 6-14.

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Calenders for Processing Plastics*

OVER the last ten to fifteen years, much progress has been made in the design and construction of plastics calenders. This lecture is a general survey of the design features of calenders at the present time and gives a brief outline of the recent developments.

The most essential constructional improvements relate to the drive arrangement, roll heating, methods of compensating for roll deflection, roll adjustment, and to the rolls themselves and their bearings. The order in which they are mentioned corresponds roughly to their importance in relation to the whole design.

Beside these improvements in basic components, new roll arrangements have been developed, and in addition to the classic I, inverted-L, and L-types, there are now the Z- and A-types, the triangular, and the S-type, a modified form of the Z-type recently developed in the USA.

The calender size is determined by the width of film to be produced. The ratio of roll diameter to face width is of primary importance since it determines the degree of rigidity of the rolls and hence the quality and accuracy of the film. It is, however, possible to increase the width of film that can be produced on rolls of a given diameter by roll heating.

Material for the Rolls

Despite disadvantages such as low modulus of elasticity, uneven grain structure, porosity at high steam pressures, the chill-cast iron roll has not yet, for economic and other reasons been displaced by the steel roll. Chromemolybdenum steel rolls are unsurpassed for strength and are superior to cast iron rolls in rigidity. However, soft PVC tends to stick to the rolls and though this can be overcome by chromium plating them, which also improves the surface finish of the film, there are some practical difficulties in doing so. Steel rolls are very satisfactory for rigid PVC.

Roll Heating

There are four main roll heating systems:

(a) Steam heating with pressure and temperature controls.
(b) Electrolytic steam heating.
(c) Combined steam and electric heating.
(d) Hot water heating.

The main difficulties in heating the rolls are controlling the temperature evenly over the whole roll, the ends tending to be at a lower temperature than the centre, and maintaining a balance between heating and cooling which becomes necessary due to the frictional heat generated. The best method available today is probably hot water heating with drilled rolls where the heating and cooling passages lie very close to the surface of the rolls, making quick temperature changes possible and enabling excessive temperatures due to frictional heating to be corrected in a very short time.

Roll Bearings

The choice between plain and anti-friction bearings is a subject for discussion and it is necessary to compare the advantages and disadvantages of both types. Plain bearings have been preferred up to the present, because of past satisfactory experience confirmed by theoretical considerations. For anti-friction bearings to be satisfactory they must be manufactured within closer limits of concentricity than can be achieved by normal production processes, and although the most suitable bearings would be self aligning roller bearings the possibility of using them is limited by physical considerations despite their obvious advantages.

Roll Adjusting Gear

The adjusting gear or screwdown for the movable rolls has undergone considerable development, each adjusting unit now has its own separately controlled motor and it is now possible to detect and compensate for variations in film thickness automaticaliy, thanks to the use of DC motors with a 20:1 speed range giving both high adjusting speed and the very low speed necessary for automatic fine adjustment.

Compensation for Roll Deflection

The mechanism for crossing the axes of the calender rolls to compensate for roll deflection has given such good results in recent years that it is indispensable on a modern calender. Another method of compensation has been developed which exerts a bending force on the extended journals of the roll by hydraulic pressure in the opposite direction to that resulting from nip pressure. The compensation which may be applied by this method is limited by the maximum permissible bearing loads and is less than that obtainable by axis crossing, but it has the advantage that it can often be fitted to a calender without axis crossing, constituting a considerable improvement, whereas to fit axis crossing is not possible unless the calender has a separate gear stand.

Drives and Speed Control

A further typical feature of a modern calender is the drive arrangement which is in an enclosed housing from which the rolls are driven by articulated shafts giving the following advantages:

1. Uniform loading of the rolls.
2. The roll bearings are relieved of the tooth pressure forces, prolonging life of the bushes and ensuring smoother running.
3. Easier removal and refitting of the rolls.
4. Perfect power transmission through the couplings, giving silent vibrationless running in any roll position.
5. Heat expansion of the rolls longitudinally does not affect the the gears.
6. No transfer of heat to the gears and lubricating oil.
7. Effective and adequate lubrication of all gears, these being in a totally enclosed casing.
8. Better support for all gear wheels on both sides.
9. Rolls can be reground without recutting gears.
10. Full interchangeability of rolls.

It is now normal to have separate drive motors for each roll, offering the possibility of infinitely variable adjustment of the friction ratio, which has numerous advantages, and enables higher quality film to be produced.

The electrical part of the drive is of the utmost importance, as wide speed ranges are required and considerable power is used. The DC shunt wound motor with its excellent and practically loss-free speed control is the ideal motor and can be designed to suit all requirements. Because the quality of the calendered product is greatly dependent on the accurate maintenance of the speed ratios between all the rolls it is essential to provide synchronization control equipment. One calender roll acts as master, and when its speed is varied the other rolls follow—the relative speed ratios remaining unchanged. Electrical equipment is now widely

** Summary of a lecture given by Reinhold Posielsky, by courtesy of Messrs Hermann Berstorff, Hanover.*

used for this speed comparison measurement and control.

Practical Applications

The inverted-L type calender has been increasingly adopted for the manufacture of soft PVC film. Z-type, which was previously used for this, is now proving successful for the rubberizing of tyre cord. S-type machines have many advantages and are being used for soft film production. A-, I- and L-types are mainly used for the rigid unplasticized materials and for the production of thick sheets. For sheet and film for laminated flooring, the I-type and the triangular arrangement, with three rolls, is generally used, and for the manufacture of vinyl asbestos tiles the I-type with two rolls. Inverted-L and S-type calenders are frequently used as multi-purpose machines for the production of both soft and rigid film.

Consumption Jumps

Canadian consumption of new rubber took a sharp jump to a new record in 1959 but imports of rubber manufacturers also rose to unprecedented heights and supplied a larger share of the market in a number of products.

Speaking at the Annual Meeting of the Rubber Association of Canada, Creig B. Smith, manager and secretary reported that 1959 consumption of new rubber (natural and synthetic) rose to a new peak of 101,478 long tons, an increase of 21% from 1958 consumption and of 11% over the previous record consumption of 91,457 tons in 1956. Synthetic rubber, the bulk of which is normally supplied by the Polymer Corporation at Sarnia, accounted for 56.4% of the total new rubber in 1959 compared to 55.7% in 1958. Average price of natural rubber during 1959 was 30% higher than the average in the previous year.

Speaking of prospects for 1960, Mr Smith stated that at the start of the year, the rubber industry anticipated rubber consumption to rise about 5% above the 1959 level. To date, however, consumption is just holding its own with 1959. He does not expect any appreciable diminution in the severity of import competition.

Chemicals by Water

THE Dow Chemical Co. Midland, Mich., has been a pioneer in the water movement of chemicals in bulk quantities—it was the first company to ship carbon tetrachloride, ethylene dichloride and styrene—and claims to ship a greater variety of chemicals by water than any other member of the chemical industry.

To develop its present system of water movements, the firm has co-operated with builders and operators of ships and barges, with terminal operators, and with governmental agencies to design and work out methods and equipment for the safe, efficient handling of chemical cargoes.

While the bulk of Dow's water movements now originate in the Texas Division—whose site, incidentally, was chosen with this consideration as one guiding factor—the first ship movement in the firm's history was by the Western Division. In 1941, liquid caustic soda from Pittsburg, California, went to the Los Angeles market by ship. The success of this venture led to the conversion of a tanker to carry chemical cargoes. In 1949 'The Marine Chemist' entered Dow's service as a 'chemical tanker.' This ship averaged 19 round trips per year and gave much of the experience that went into the design of the first tanker ever built for the specific purpose of moving liquid chemical cargoes — the 'Marine Dow-Chem.' Methylene dichloride, 73% caustic soda, glycols and hydrochloric acid are among the products transported—the latter being carried in rubber lined tanks.

The capacity of this 18,000 ton, three-island, single-screw tank ship is 16,000 long tons—or 35,000 gallons —of liquid chemicals.

Principal design difference between this $8,000,000 ship and other tankers is in the protective arrangement for cargo tanks, which is complicated by the fact that the Marine Dow-Chem is intended to move mixed cargoes which can consist of as many as 11 products. There was one additional requirement for the designers. Sea water — whether in the sea itself or taken aboard as ballast for the vessel—was not to be allowed to come in contact with loaded cargo tanks.

To solve the isolation problem for each part of the cargo as well as the sea water, the ship is constructed with double bulkheads. This puts a minimum of two thicknesses of steel between any two cargo tanks and between cargo tanks and the sea.

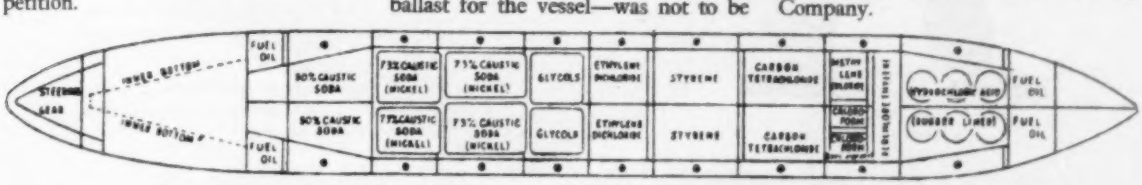
Protection of each item of cargo is assured by fitting the ship with separate transfer systems — pipes, pumps, connexions, and vents—for each different product to be carried. This arrangement means that the ship can take on or discharge all sections of a varied cargo simultaneously—and without possibility of contamination of any product carried.

PTFE as Release Agent

The ITS Rubber Co. are using a very fine coating of Permaston PTFE on some of their more complex moulds for rubber soles and heels. As a result, a clean breakway of the moulding from the mould is said to be obtained with minimum difficulty and wastage.

The PTFE is sprayed on the mould in thicknesses of 0.0005in.; the process is known as dispersion coating. The final operation ensures that the PTFE is properly bonded and involves sintering of the mould in ovens at temperatures averaging 400°C. A growing demand for PTFE dispersion coating has resulted in recent price reductions but it is still a fairly costly process and therefore only suitable for use in those cases where its many unique qualities can offer the utmost production economies. The 'Commando' soles and 'Chevron' heels of the ITS Rubber Co. are a case in point as the intricate cleat patterns call for a very high degree of moulding accuracy.

Mr W. G. M. Price, director and secretary of Linoleum Manufacturing Company, has been appointed deputy managing director. Mr D. M. Sleep has been elected to the Board. Mr E. H. Crane and Mr T. Thirley have been appointed directors of Runnymede Rubber Company, a subsidiary of Linoleum Manufacturing Company.



Arrangement of a typical cargo as carried by the Marine Dow-Chem *Ballast Tanks

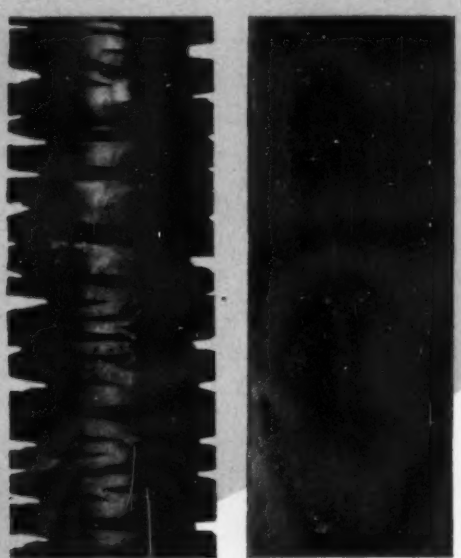
how to vastly increase the useful life of rubber...

Effect of Curing System on Antiozonant Retention in SBR Stocks after Vulcanization

(All contain 3.0 phr UOP 88; 40.0 phr HAF black)

Compound	Accelerator	Sulfur, phr	% Extractable Antiozonant
1082....	2.0 phr benzothiazyl disulfide	2.0	66.4
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1087....	None	2.0	~100.0
1088....	1.0 phr benzothiazyl disulfide	3.0	74.6
1063....	1.0 phr benzothiazyl disulfide	2.0	79.6
1089....	1.0 phr benzothiazyl disulfide	1.0	88.6
1063....	1.0 phr benzothiazyl disulfide	2.0	79.6
1084....	1.0 phr N-cyclohexyl-2-benzothiazole sulfenamide	—	—
1093....	1.0 phr diphenylguanidine	2.0	~18.0
1085....	2.0 phr tetramethylthiuram disulfide	—	35.0
1090....	4.0 phr tetramethylthiuram disulfide	—	12.9

The SBR specimens below were exposed to ozone at 100°F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.



Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.

CONSIDER THE EFFECT OF YOUR CURING SYSTEM ON THE EFFECTIVENESS OF A CHEMICAL ANTIOZONANT

In compounding rubber, there are several things which are important in assuring maximum crack-free life. First, you must use a potent antiozonant like UOP 88 or 288. Next, consider what a vast difference in effectiveness can be realized by your *curing system*.

The right antiozonant used in correct proportion is of primary importance. Then, by using the proper accelerator, you can promote its maximum effectiveness, and thus contribute to maximum ozone protection.

Look at the two rubber test strips illustrated. Both were formulated with UOP 88 . . . but note how much more effectively the antiozonant worked when accompanied by this change in curing systems—a vast increase in resistance to cracking. The table above the test strips shows how the *proper* accelerator aids antiozonant effectiveness.

Help in achieving maximum effectiveness from UOP 88 or 288 antiozonants in your rubber formulations is available through UOP facilities and technical personnel. Just write or telephone our Products Department.

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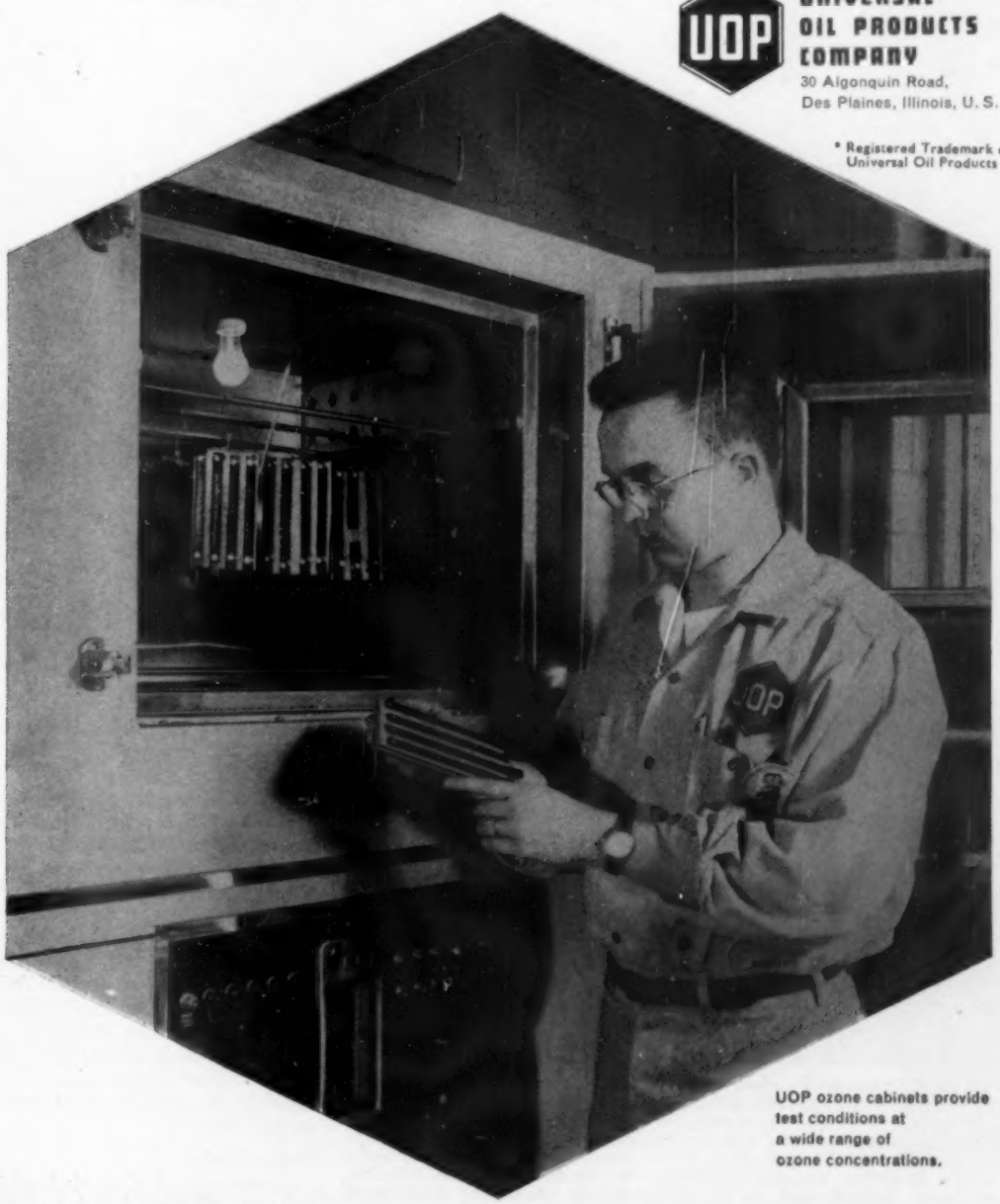

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MEN *and* MATTERS

A Review of People and Events

by George A. Greenwood

FILLINGS for teeth from scraps of metal, medicine from grass, artificial limbs from parts of crashed aircraft — these were among the medical and dental supplies improvised by scientists held captive by the Japanese in Changi pow camp after the fall of Singapore. It is one of the prisoner - scientists, Mr V. H. Wentworth, of Harefield Place, Uxbridge, who will be talking in the Home Service about this ingenious application of science in circumstances of great difficulty. A Londoner, Mr Wentworth was a research chemist with the Rubber Research Institute of Malaya for several years before enlisting and being captured in the fall of Singapore. He was a prisoner for over three years. Now he is manager in London for the Plastics Development Group of Monsanto Chemicals.

More About that Bottle

You will remember the correspondence about the 20-year-old hot water bottle which a Mrs Chivers wrote about from the West Country, and the prompt claim from Mr F. H. Puxty, the chief chemist of the Greengate and Irwell Rubber Co. Ltd., of Salford, Manchester, that it was one of their manufacture. Having had the chance from the two handsome samples which Mr Puxty sent me to compare Mrs Chivers' drawing and the real thing, I am quite sure that he has made out his claim.

Since this story I have received several other interesting letters about the life of hot water bottles. Mr T. W. W. Davie of North British Rubber, writes to say that he thinks it is possible that the one which began it all may have been an example of the Dice design bottles manufactured at his company's Castle Mills, but from the illustrations in the catalogue which he also sends I am certain that Mr F. H. Puxty, and *his* sample holds the field. At any rate, and to keep the ball rolling, I am sending a copy of this catalogue, as Mr Davie requests, to Mrs Chivers.

Any Advance on 30?

Mr E. Bowker, sales manager of the general rubber goods division of Dunlop, also wrote to me about the bottle. Mr Bowker says that at the time Mrs Chivers' bottle was produced it was standard practice in the trade that certain types should be branded 'Best British Make,' without showing the actual name of the manufacturer, and he adds: 'From the vague description of the pattern we cannot definitely claim that it is of our manufacture, but we thought you might be interested in reports which have come to us from other quarters.' He attaches copies of a few from the batch which reached Dunlops during 1959.

In one case a woman writing from Sale, in Cheshire, asks: 'Is 30 years of continual use a record for a rubber hot water bottle, I wonder? Well, that is my friend's age. I think it is marvellous.'

This beats Mrs Chivers' bottle by a decade. Any advance on 30?

Fred Foxley

I regret to report the sudden death of one of the best-known men in the rubber industry in the North of England and the Midlands. I am referring to Mr Fred Foxley, manager of the Dealer-Relations department of the Goodyear Tyre and Rubber Company. He was a Lancastrian, and he certainly had much of the good humour and common sense which we associate with the county. He joined Goodyear at the Manchester branch in 1919, and in 1946 he became manager, Dealer Relations.

Clive Gardiner

Again, I was sorry to hear the other day of the death of Mr Clive Gardiner, at the age of 69. He was not an industrialist. In fact, he was the son of A. G. Gardiner, the greatest editor of *The Daily News* since Charles Dickens, and he himself was a well-known artist.

But as a young man, and when I first knew him, he had begun a very interesting association with rubber which, in one way or another, he never lost, for he was one of those artists who believe in wedding art to commerce. He was in his early thirties when he was commissioned to do the decorations for the Rubber Pavilion at the British Empire Exhibition at Wembley, and a fine series of designs to illustrate the production of rubber he turned out. They certainly attracted a lot of attention at the time.

Easier Birth

A new method of alleviating labour pains in childbirth is being tried out

When Mr H. E. Humphreys Jr., chairman of United States Rubber Company, was in this country for the annual general meeting of the North British Rubber Company, of which he is also chairman, he took the opportunity of viewing the recent modernization scheme and developments at the factories at Edinburgh and Dumfries. (*left to right*) **D. F. Vallis, mechanicals factory manager, W. T. M. Beale, Minister, American Embassy, Mr Humphreys, T. A. Clayton, director of North British, and R. D. Hunt, deputy managing director of North British**

Finding a way of making a sizeable addition to profits —without risk—is guaranteed to raise Board Room morale. This particular company uses expensive industrial solvents that used to go to waste after they had done their job. Now, a Sutcliffe, Speakman recovery unit traps them for re-use. Savings are substantial—the Board is beaming.

But solvent recovery is not merely a matter for the bulk user. Small-scale recovery with smaller capacity plant can be, comparatively, just as profitable. Tell us how much solvent you use and we will tell you what recovery can do for you. You'll probably be surprised how much you will save and how soon you will start to save it.

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at the Rothschild Hospital in Haifa, Israel. The mother is enveloped in a rigid plastic jacket when labour sets in; air is pumped out, and air pressure on the body surface reduced. As a result, the abdominal muscles extend, pressure on the womb is reduced, and labour pains appreciably diminished.

The method was developed by Prof. O. S. Heiyns, of Witwatersrand University, Johannesburg.

Mr N. G. Bassett Smith

As announced in last week's *RJIP*, on June 1 Dunlop's Composition Division was renamed Dunlop Chemical Products Division. General manager of the division is Mr N. G. Bassett Smith, who joined Dunlop in 1927. He was manager of the rubber wing division at Fort Dunlop when war broke out. During the war he held a staff appointment with the Eighth Army in Italy and he was a Lt.-Col. when demobbed in 1946. He returned to Fort Dunlop as sales manager of Dunlop Special Products and became manager of the Compositions Division when it was formed. He was appointed General Manager in 1957.

Mr Bassett Smith is a member of the council and executive of the British Rubber Manufacturers' Federation, a member of the British Plastics Federation, and is connected with many other industrial bodies. On June 11, accompanied by Mr T. Thomas, the division's technical manager, he goes on a month's tour of US chemical plants.

Top Hose Salesman

On the heels of the completion of its new hose factory in Edinburgh, reckoned to be the most modern in Europe, North British Rubber announce the appointment of V. M. Wallis as sales manager of their hose division. Mr Wallis commenced his career in the rubber industry in 1939 and was with BTR until 1958 except for his war service as a Fleet Air Arm pilot. He will operate from the industrial products sales at 62 Horseferry Road, S.W.1.

T. S. Martin, previously field sales manager, is appointed technical sales manager, wire braid hose.

Disc Protection

One of the problems faced by a public record library is that of covers. They quickly become soiled, battered and dog-eared, with constant pulling out and pushing in of the record.

Widnes Public Library has provided an answer by issuing each record in a zip-fastened plastics case supplied by E. S. and A. Robinson Ltd., of Bristol. Made from 0.018in. red embossed PVC, the case measures 16½in. by 15in. and is silk-screen printed with the name of the library in white.

* * *

The oldest department store in Japan, Shirokiya—founded in 1662, will show a selection of modern British goods, including melamine tableware, in a June exhibition. A polythene jug from Ekco and a door fitting moulded by Lacrinoid will also be displayed. Most goods have been chosen from the Council of Industrial Design's Design Index.

* * *

In the final of the annual Ben Skittles Tournament in Edinburgh for the Finlay Thomson trophy, Dunlop's Edinburgh depot No. 1 team, captained by depot manager Alex Simpson, beat the North British Rubber team by 1,054 points to 878.

* * *

Delegates from the Research Association of British Rubber Manufacturers to the International Symposium of Macromolecular Chemistry in Moscow (June 14-18) include Dr W. F. Watson, Director of Research, R. C. W. Moakes and R. J. Moseley.

Question Corner—121

(Second Series)

446. What is 'blocking,' and what causes it in polythene films?

(Answer next week)

Answer to Question Corner—120

445. The stiffness of a plastic denotes its resistance to 'elastic deformation' under low rates of loading and the apparent modulus of elasticity is synonymous with stiffness.

The Clash and Berg method measures the modulus of torsional rigidity over a range of temperatures. Its greatest limitation is its insensitivity at low values of modulus with specimens of convenient thickness—say 0.010 to 0.100in. (Ind. Eng. Chem. 1942, *34*, 1218; Trans. PI July 1950). It is possible to measure the rigidity moduli of thin films of cast nitrocellulose at room and higher temperatures.

The flexural modulus of elasticity may be determined using the Olsen Stiffness Tester. This consists, essentially, of a vice for holding the specimen to which a pointer is attached; a pendulum weighing system with an angular deflection scale, a second pointer indicator; and a fixed load scale which measures the deflection of the pendulum system (ASTM D.747-50; IRW 1951, *24*, 443). A monograph for calculation of stiffness when using this apparatus is given in ASTM Bull., 1951, No. 173, 59.

A Cenes du Nony Precision Tensiometer is used to evaluate the stiffness of elastomers at low temperatures, and an autograph apparatus for measuring the stiffness of non-rigid plastics is described (RA (NY) 1943, *53*, 319; Mod. Plast. 1949, *27* (1), 115).

The Gehman Torsion Apparatus is used for determining the low temperature stiffness of elastomers (ASTM D.1053-49T).

(Another question next week)

Polly Ester Says . . .

'Synthesis—Sunday sermon'

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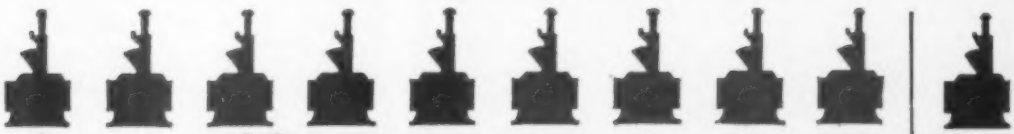

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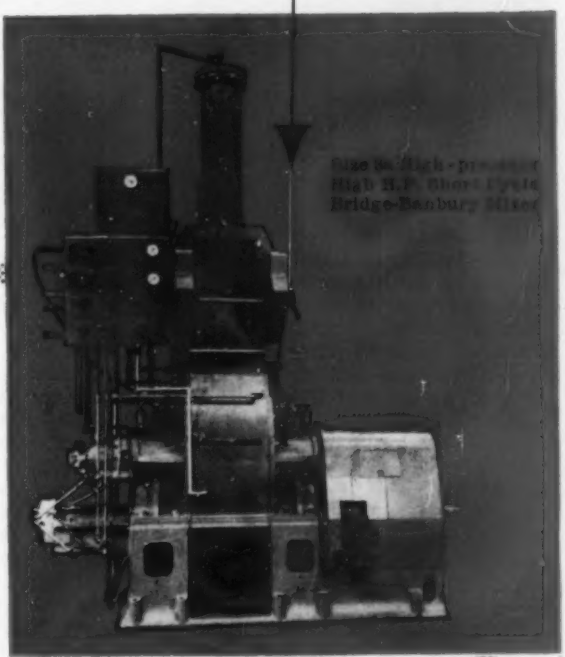

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Touring for Tyre Makers

A FEW paragraphs in the Press the other day concerning the travels of a welfare officer to recruit Italian girls from their homeland for the woollen mills of Yorkshire brought back memories of a war time trip in India to try to collect labour for the rapidly expanding Dunlop factory on the banks of the Hooghly, at Sahaganj.

On would perhaps imagine that with India's teeming millions the supply of labour would be no problem at all and under normal conditions this was quite correct. However, this was after Pearl Harbour and the planned Japanese invasion of India via Burma had only been held up because they had overstretched their supply lines and due to the good luck that nobody had ever constructed any good roads or railways connecting North East India and Burma. The monsoon season also gave us a breather. There was nothing else to stop them!

The Trek

The first 50lb. anti-personnel bomb dropped in Calcutta in the early part of 1942 caused a mass exodus. All those who were not local permanent residents and there were thousands of them, decamped up the Grand Trunk Road and paid any price to get a rail ticket out of Howrah. Most of those who used the main road were the owners of cattle, bullock carts or 'tikka gharries,' horse drawn vehicles, like boxes on wheels, that plied for hire. By the time they had reached the 35th milestone the animals were showing up in very poor condition and the owners were wondering what to do.

One of the local landowners in this area who was also a contractor for the factory decided to do a bit of speculation. He started buying up some of the tired cattle, the bullock carts, horses and gharries and obviously knowing the state of mind of the sellers was not prepared to bargain. When tackled on the advisability of collecting this herd of animals and vehicles he merely smiled and said, 'They'll be back.' The refugees having plodded another 50 or 100 miles up the dusty road and hearing that life in Calcutta was still proceeding despite their flight, decided they had been too hasty and started to straggle back. Some of them probably hastened their steps to try and reclaim their property at the same price that they got for it but no doubt some hard bargains were driven for the

Now by Hooghly's muddy shores
Where we strive to do our chores,
Making tyres for the wheels of Hindustan,
The Japanis came and bombed us
And the Biharis, they shunned us,
As the trek up the Grand Trunk Road began.

Author's note: A very free and unworthy translation of the Bengali song of Sil the Spreader. He, being a local dweller, was rather scornful of anyone from a foreign Province. It was by no means only the inhabitants of Bihar that disappeared up the Sarak-i-Azam or Grand Trunk Road. With apologies to the mangled poets!

By ERIC P. B. EDWARDS

loving care bestowed upon the abandoned animals and the cost of feeding them while their owners went on a Barbara Moore!

Although some of the labour at the factory disappeared on this occasion the situation was not serious. The growing build up of Allied forces taking place in the area and the numerous camps and airfields being organized did however gradually begin to have an effect on the labour position. The American camps, in particular, were the biggest trouble. As usual they had more money available than the British forces and the attraction was too much for many of the factory workers.

Indentured Labour

The Government appreciated that although there were pockets of labour shortage, especially in Bengal, there was still plenty of potential labour available in the rural areas outside the Province. Centres were started for the recruiting of men from the surrounding districts who were prepared to go and work at any specified place in India for a definite period. Although not classified as such it was, in fact, a form of indentured labour by which means, in the last century, such places as South Africa, Kenya, Fiji, British Guiana, Ceylon and Malaya obtained the basis of their present day Indian populations and the problems now connected with them.

Bombs Away!

By the beginning of 1943 the Allied forces were really being built up in the Bengal and Assam areas and counter measures were being taken to harass the Japanese behind their front lines. The latter were also building up their forces and hoping to accomplish their entry into India. To show they had some air striking power they now started making a few nuisance raids over the industrial centres in the locality and on January 15 1943, on a beautifully clear, bright moonlight night it was the turn of the Dunlop factory.

Three raiders came over and dropped about 15 bombs. There was no really heavy stuff, again mainly anti-personnel, one phosphorus, incendiary bomb and a leaflet bomb. Unfortunately one of the AP bombs fell amongst the operatives' living quarters and about a dozen were killed and 20 or more wounded. It was interesting to discover later that the only incendiary dropped fell outside the factory boundary wall exactly opposite to a large dump of tyres waiting retreading. Had the pilot been another 100ft. over on his course this would have caused considerable damage. The leaflet bomb fell amongst some trees within the factory boundary, near to the old power house. Here again there was bad organization on the part of the raiders and the bomb burst somewhat ineffectually on impact with the ground causing all the leaflets to be scattered within a very small area. These were all very soon collected and should have all been handed in or destroyed but they were considered such a good souvenir of the occasion that at least one set had to be preserved for posterity. Two of them are depicted here although the effect created by the gaudy colours of the original is missing.

It can be imagined that this episode was not very encouraging to the labour force but to give them their due the number that left hurriedly was not nearly as many as we expected. However, it was no incentive to fresh recruits and it was decided that I should do a trip to one of the Government centres and report my findings.

Quest for Labour

The labour centre chosen was at Gorakhpur in what was then called the United Provinces but is now in Uttar Pradesh or the Northern Province. All labour engaged at the factory was medically examined before final employment. Therefore it was not much good making a trip of about 600 miles with the idea of selecting likely labour which might be turned down due to some medical

complaint. As a result, Dr Das the works medical officer at the time, was co-opted into the expeditionary force. The third member of the party was Mazibar my 'bearer.' All those who have lived in India, even the transient travellers during the war know the value of a servant of this type for foraging on a long cross country rail journey.

Finally all the arrangements were made, the reservations booked and a provender box packed, just in case of emergencies. This was a lesson well learned from the trip mentioned previously during the sabotaging campaign. We left Howrah on No. 5 Up Punjab Mail at 16.45. All Indian timetables are sensibly printed on the 24 hour basis to avoid confusion. This particular train used to do a journey of 1,463 miles from Calcutta to Peshawar and as it was all India in those days without any complications of Indian-Pakistani frontiers one could make onself really at home for the next 2½ days and get to know the cockroaches, the flies and the mosquitoes by their first names. A few air-conditioned first class coaches had been introduced on the EIR and GIP Bombay-Calcutta Mail and the BB and CI Frontier Mail round about 1938 but this comfortable travel was still limited.

Window Juggling

The normal first class compartment was either a two berth coupé or a four berth. The windows of these carriages were roughly 2ft. square and had quite an assortment of shutters and windows for the varying conditions of climate. All these were of the pull up type with a forward movement at the end of the heave, to locate them on a ledge. There was the plain glass window, the dark glass for the intense glare, the slatted wooden shutter to let in some air also dust, mosquitoes at night and flies by day. To counteract the two latter evils there was the wire gauze contraption which could be used in conjunction with the slatted shutter but this, of course, by no means kept out the dust. With six windows to a four berth compartment it will be seen that there were quite a few permutations one could work out to while away the time on a long journey.

It should also be mentioned that there were safety catches on all the windows and doors and it was essential to see that these were properly fixed before laying out the bedding and going to sleep at night. Many a traveller has omitted to do this and found on awakening that the compartment has been ransacked by the light fingered, silent fraternity that specialize in this sort of crime. This generally occurs when the traveller has very carefully fastened the windows but has forgotten the doors or has not put back the door safety catch after somebody has got out during the night. The 'operator' tries the door of a darkened compartment very carefully on the opposite side to the platform at a stop. If it is open he jumps on to the step as the train moves off. Once it has picked up speed he enters quietly and gets to work. Any wallets or valuables left in the pockets of clothes hanging on convenient pegs are the first to be collected. Having got the loot he retires once again to the step outside the compartment and hops off at the next halt. It should be remembered that generally speaking the climate is in his favour to adopt this method of operation and there are very few tunnels or overhead bridges on the normal main lines across the Indian continent. Also a great deal of the mileage is single track with no danger from trains the opposite way.

We had an uneventful journey up the Ganges Plain and arrived at Moghal Sarai near the right bank of the holy river the following morning at 7 o'clock. Just time for some tea and toast from the refreshment room and off we went over the bridge, a mile or more long, spanning the river to Benares, the holiest city in the world to the orthodox Hindu. There was no time on this occasion to visit the famous 'Burning Ghats' where those that are fortunate enough to die beside Gunga Mai, Mother Ganges, are cremated and their ashes sent on their final journey to the sea.

We had to change at Benares from the broad gauge system to the metre gauge line and although we were able to enter the waiting train there was over an hour's delay before the scheduled starting time at about 9.00. This period was spent in getting the tuck box organized for a more substantial breakfast and getting a further supply of 'char' to wash it down. Having a picnic in the compartment while waiting for the train to start is a good way of passing the time but the snag is that unless one puts up all the shutters and eats in dark seclusion the operation is considered by the locals as something on a higher level than watching the animals fed at the zoo.

Churchill, Wilhelmina, Chang Kai Shek and Roosevelt persuading India to help them—Japanese propaganda leaflet

Translation: All those countries whose destruction is certain are looking enviously at the raw materials of India. Do not be flattered by their sweet words

Riding the Roof

So far we had travelled 430 miles and the next stage of our journey was a 100-mile trip to Bhatni, on the main line section of what was then known as the Bengal North Western Railway. On this partcular section lies Sarnath, only six miles from Benares and a famous place of pilgrimage as this is where Buddha preached his first sermon. The well known Lion Capital, the design of which has now been incorporated into the official seal of India is also located at Sarnath.

There must have been some special festival that had just concluded as hordes of yelling, excited men, women and children tried to board the train at this stop. Some readers may have seen the recent film 'North West

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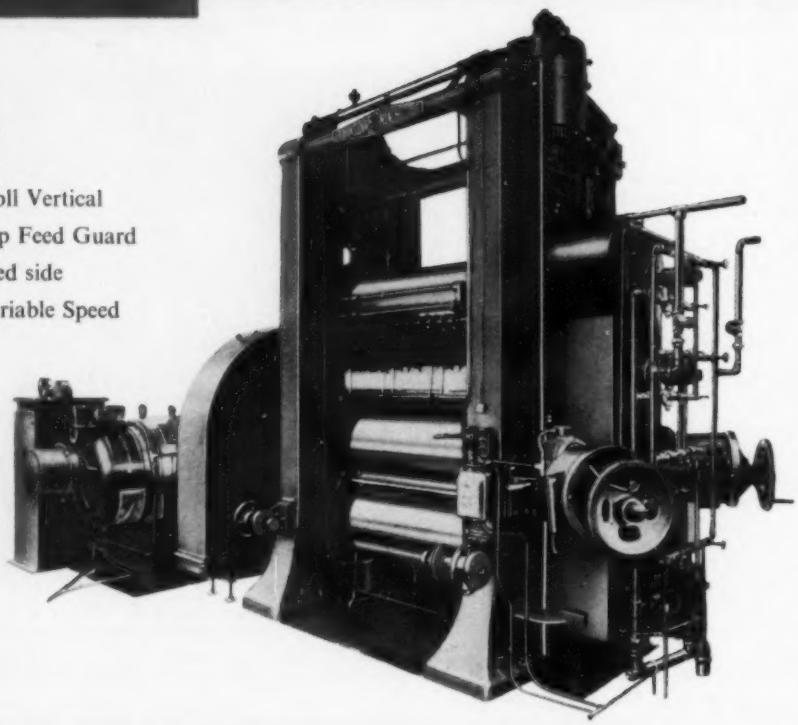

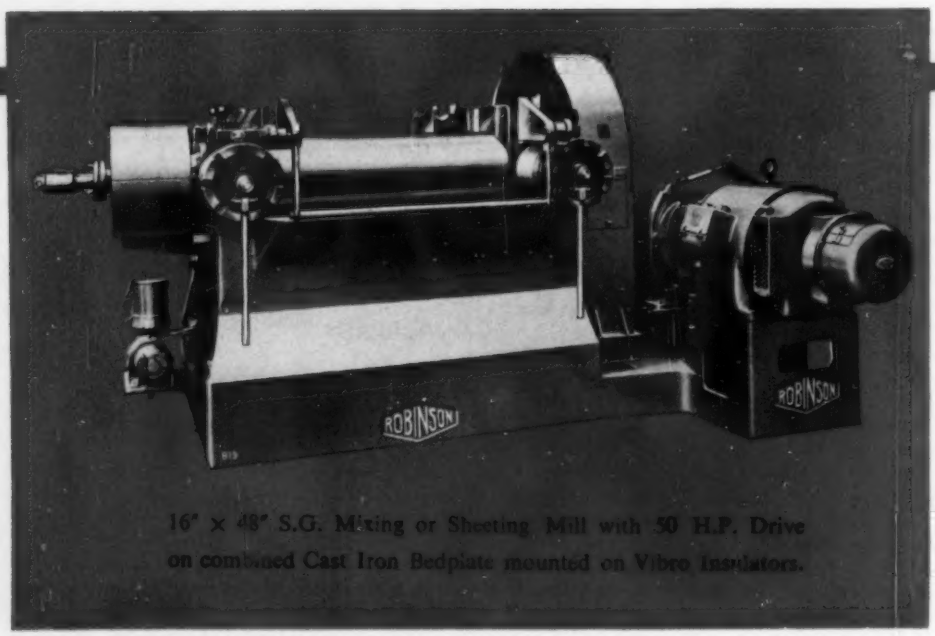

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Frontier' which shows people hanging on to a train like a swarm of locusts. This was no exaggeration and the train left Sarnath in much the same condition, with the running boards all overflowing with humanity and the roof of the train also occupied. The marvel was that nobody seemed to fall off. The railway officials turned a blind eye to the proceedings as there would have been a riot if they had tried to stop them getting on this, the only train of the day and there were no obstructions to sweep them off to destruction and only a single line track.

The 100-mile journey took about 5½ hours so it could hardly be called express service but as there were 17 intermediate stops and with the time taken for passengers to make themselves comfortable sitting cross-legged on the roof and clambering down at their destinations the average speed of about 18 miles an hour was not as bad as it sounds. The officials concerned did believe in some safety first; the train was never flagged off until everybody was sitting down on the top of the carriages. Despite all this we arrived at Bhatni, where this train finished its journey and returned to Benares, with enough time to spare for a meal in the refreshment room before the connection was due.

The final stretch to Gorakhpur was only 43 miles but it took us from 15.14 to 17.33. Here again there were seven stops but roof riding was forbidden. Perhaps it was considered unseemly on the main line section whereas it did not matter on a feeder branch line. There were also more trains per day. One of the villages on this portion of line, Chauri Chaura, perhaps tries to forget the unenviable notoriety it acquired in the 1920's when the local 'goondas' or anti-British gang set fire to the police station and cooked alive half a dozen or so of their own countrymen for eating the Government's salt as they are picturesquely wont to call the taking up of a Civil Service appointment. We finally reached our destination and were met by the District Officer and his assistant.

There was, of course, not much time for anything that day but it did give us a chance, during a pleasant evening at the D.O.'s bungalow to get together and discuss the labour problem from his angle and from our own. Arrangements had been made for about 100 men to be available for examination the following morning at the local recruiting centre. Having had the final nightcap with my host and killed off a couple of mosquitoes that had been enclosed in the net over the bed, the previous night's somewhat disturbed sleep was retrieved.

In the morning Dr Das and I went with the DO to the assembly point and the examination started. We lined them up in convenient rows on the open space by their temporary living quarters and went through the procedure of 'inspecting the guard' by walking along amongst them and picking out likely ones for a medical examination. Here's a 'lamba wallah,' a tall one and a good build for a potential mixer on an 84in. mill. That 'tagra' one of sturdy physique and muscle should make a good No. 11 Banbury operator. And look at that 'palwan,' literally a well nourished one or an all-in wrestler type. He's just right for handling those moulds from the autoclaves if he doesn't melt away in the heat on the job when the temperature is 110° to 115° before the monsoon breaks. And so it went on, the large and the tall and the small, they were all viewed, we regret to admit, not as individuals but as operators for a certain job where it was known the labour was most needed.

As is very often the case out there, those that looked the fittest were found to have faults on medical examination. We ultimately had a band of about 50 that were up to our standard, who were then photographed in groups of half a dozen or so at a time to give the production people back in Bengal some idea of what we intended to pass on to them. It was agreed that the District Officer should keep these men, whose names and addresses had been recorded in a special register, for one week to give us a chance to return to the factory and decide whether we were prepared to abide by the employment regulations concerning this type of labour.

Churchill eats the chained Indian's liver while the American army carves up the prisoner

Translation: Use the stick on the devil and so save India

Journey Back

We had decided to return by an alternative route and at 7 o'clock the following morning caught our train and retraced our tracks as far as Bhatni. Instead of changing there we continued along the main BNWR line through Sonepur, Barauni and so to Katihar. Those readers who are railway enthusiasts will perhaps recall that Sonepur has the longest platform in the world, over a mile long. Why it should be this length it has not been possible to discover as traffic through there is not particularly heavy and no trains were queued up when we passed through.

Barauni has a reputation for another reason, especially for the new or unwary traveller. Those who served in India during the last war and the pre-war British regular stationed out there were all acquainted with the particular type of Indian hawk, commonly called 'kites' or 'chil' to give it its correct name, which glide around the heavens so majestically and sweep down, a bolt

KETJEN CARBON

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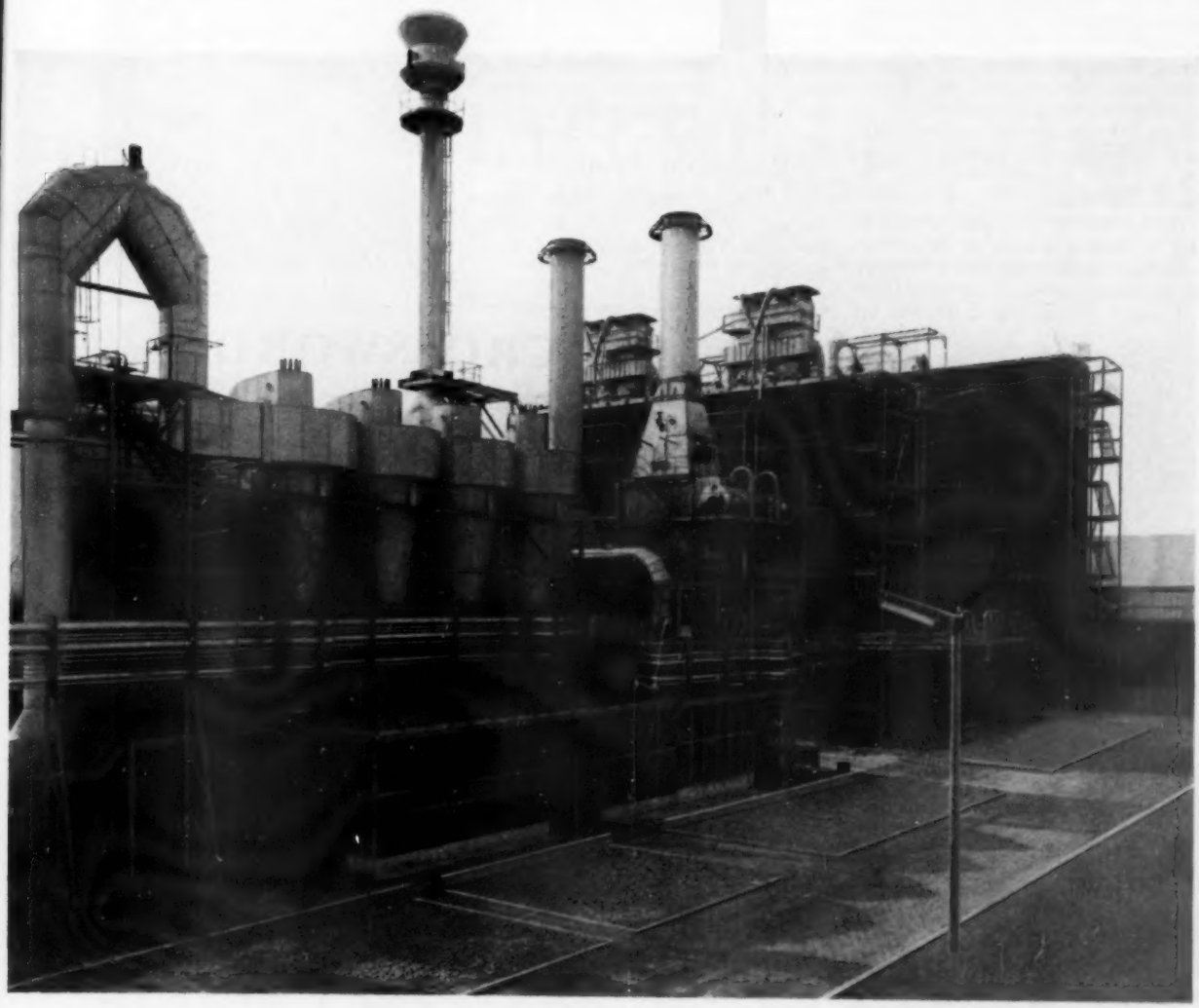


from the blue, to scavenge or rob when anything is available. Most of those concerned did not appreciate this bird's true worth in the scavenging line and gave it a most unworthy and undignified appelation. For some unknown reason the breed of 'chil' at Barauni has always been particularly cheeky. The 'pan-biri wallahs' selling their betelnut sandwiches, country-made cigarettes or sticky sweet 'jalebis' either carried their wares up and down the platform beside the trains in glass cases or in covered baskets, balanced on their heads. Very often the innocent traveller on the platform would buy his food, delivered to him on a piece of banana leaf or other convenient foliage. As he walked from the vendor back to the carriage, perhaps just taking the first morsel up to his mouth, to anticipate the joy to come, there would be a sudden —woosh! Leaf, contents and all would be on the station roof or in a convenient tree before he really appreciated what had happened. It is not known whether the vendors bred these sky raiders to increase sales or whether this menace still exists at Barauni in 1960.

At Katihar we changed again and took a train to Godagiri Ghat, then a two hour steamer trip on the Ganges, on its lower reaches, to Lalgola Ghat and finally the last leg of the tour by train from there to Sealdah, Calcutta, 48 hours after we had left Gorakhpur.

Clan Loyalty

The question of employing the labour chosen was then fully discussed and it was agreed that although their conditions of employment were somewhat different from our own we were prepared to give it a trial. But we had not foreseen the clanishness of those we had picked and no whisper of this was mentioned at Gorakhpur when all those chosen had agreed freely that they were prepared to come and work for us. Agreed that our idea of a medical at the centre itself, before employment, was something new to them, yet there must have been a barrack-room lawyer amongst that bunch! When the District Officer was informed that we would like him to send us the men we had vetted the fun started.

They maintained that they were members of different cliques which perhaps came as groups from particular villages. We had split these clans and they were not prepared to work apart. This was all a put up job and no doubt a spot of 'bakhshish' in the right quarter at the recruiting centre to the one who went round touting for labour would have done the trick. In the meantime, however, we had encouraged our own labour to try and get their friends and relatives to come and work alongside them and told them we preferred to do this to recruiting Government labour. This sales talk was producing results at the time of the impasse and we were in the position to tell the clans they could stick together and we had no further use for them.

The journey had not been a waste of time and money as we found that other workers came independently from the Gorakhpur area seeking work as a result of our own propaganda outlining our good wages and working conditions to people to whom we talked while on our travels. Fortunately we did not have any more raids on the factory although the Japs made a heavy daylight raid on the Calcutta dock area of Kidderpore in December 1943, but it was their last fling at the Hooghly as by then the Allied Air Force was in a position to raid their bases in Burma and beyond: the tide was turning.

Pussyfoot Products

Pussyfoot Products has been formed into a limited company under the name Larkhill Rubber Co. Ltd. Address is Street, Somerset.

UNCRUSHABLE HOSE

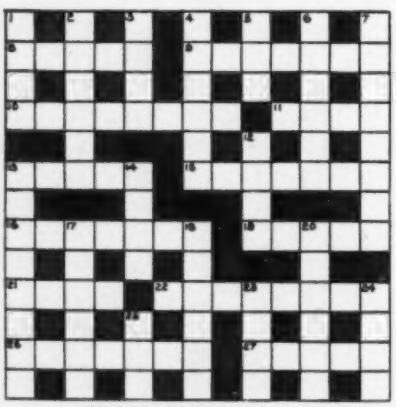
More information has now been issued by BTR about Nypac (man-made fibre belting) and Springback suction hose, which were both shown at the Mechanical Handling Exhibition (*RJIP*, April 30, 656).

Some of the advantages claimed for Nypac, which are nylon wefted and combined with either cotton, rayon or Terylene, are higher safe working stress values over conventional cotton belts, better impact resistance, better troughing characteristics, and greater resistance to longitudinal tearing. The range is available in three qualities of rubber cover: 4,000lb., 3,500lb., and 2,500lb.

Springback suction hose, BTR say, incorporates a new construction designed to obviate damage from accidental crushing; a strong, flexible rope helix is used instead of the conventional wire spiral reinforcement. The helix is fully embedded in the hose wall, giving a smooth, clear bore with a corrugated exterior for increased flexibility and ease of handling.

High-grade rubber compounds are said to have been incorporated to make the hose almost 100% abrasion proof. Able to withstand high vacuum, the hose will also operate at low pressures on the delivery side of pumps.

RJIP CROSSWORD



CROSSWORD No. 72

CLUES ACROSS

8. This tube is essential in some tyres.
9. Newton first recognized this with solemnity.
10. Two shillings go a long way towards this halogen.
11. A Scottish island.
13. A Latin father.
15. Arms around Ada and the fleet's all there.
16. New rubber from old.
19. Dead beat? Car wheels are, by the sound of it.
21. A sword lubricated at the end.
22. Small science takes 20 down for a cleaner.
26. Fill with gas but not on time in the end.
27. When of rubber this is found on many cots and hospital beds.

CLUES DOWN

1. Quarrel but back it first.
2. Sunlit, mixed, as an affront.
3. This rabbit is a children's favourite, Brother . . . .
4. . . . and in an African country.
5. To be below this is a golfer's dream.
6. Clear and it flows.
7. This rubber is isomerized.
12. Leave out the decoration first.
13, 25. A well-known softener for rubber (8, 3).
14. Genuine.
17. Principals found in 4 down, for example.
18. This mouse is a children's favourite also.
20. Derived from latex and having 3 down around mixed-up.
23. Suit this Scottish isle in another way.
24. Speed at which the deserter begins.
25. See 13 down.

(Solution appears on page 915)

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Plastics Statistics

APRIL EXPORTS AND IMPORTS

EXPORTS of plastics materials during April 1960 were 15,848 tons, valued at £4,003,188—well up on the figures for the same period last year: 12,395 tons and £3,217,965. Total exports for the first four months this year stood at 60,348—an increase of 12,326 tons over the 1959 figure.

This is disclosed by the official Trade and Navigation accounts for April, which show that France took the biggest quantity: 2,260 tons, followed by Australia (1,189 tons), Hong Kong (927) and Sweden (814).

Imports during the month, as during March were more than doubled; 7,378 tons (£2,528,637) compared with 3,680 tons (£1,625,831). Figures for the first four months reflect the same increase: 29,880 tons (£9,600,045) compared with 14,142 tons (£5,551,650). USA continued to be the major supplier with 2,117 tons, followed by Western Germany with 1,742 tons.

Details of imports of plastics materials during April, 1960:

	Tons	£
Alkyd solid and liquid resins, solutions, emulsions and dispersions	196	38,927
Cellulose plastics:		
Photographic (including cinematograph) film base (except acetate butyrate)	158	203,916
All other	262	168,700
Polyvinyl chloride:		
Polymers and copolymers	1,720	276,142
All other	727	238,925
All other	4,315	1,602,027
Total	7,378	2,528,637

Exports of plastics materials during April, 1960:

	Tons	£
Acrylic sheet, rod, tube, film, foil and profile shapes in primary form	491	305,853
Alkyd solid and liquid resins, solutions, emulsions and dispersions	590	111,224
Aminoplastics:		
Solid and liquid resins, including solutions	962	116,345
Moulding and extrusion compounds	863	152,990
Cellulose plastics:		
Moulding and extrusion compounds	304	98,780
Sheet, rod, tube, film (excluding regenerated cellulose), foil and profile shapes in primary form	148	90,491
Phenolics and cresylics:		
Solid and liquid resins (straight and modified)	857	227,367
Other	526	206,872
Polystyrene	887	184,067
Polythene (polyethylene) sheet, rod, tube, film, foil and profile shapes in primary form	108	45,468
Polyvinyl chloride:		
Polymers and copolymers	1,121	160,078
Moulding and extrusion compounds	840	188,915
Sheet	664	289,740
Other	120	25,575
All other	6,573	1,715,203
Waste and scrap (including celluloid and film waste and scrap)	814	84,220
Total	15,848	4,003,188

UK exports to countries in the European Economic Community (Common Market) and the European Free Trade Association are shown below.

EXPORTS TO EEC

	Apr. 1959	Apr. 1960
Western Germany	270	427
Netherlands	722	603
Belgium	476	696
France	790	2,260
Italy	625	676
	2,883	4,662

Exports to Commonwealth countries during the month were 4,481 tons (3,840 in April, 1959) and exports to all other foreign countries were 4,109 tons (4,028 tons).

EXPORTS TO EFTA

	Apr. 1959	Apr. 1960
Sweden	508	814
Norway	350	387
Denmark	412	789
Switzerland	193	263
Portugal	283	230
Austria	174	152
	1,920	2,635

British Standards

Protective Gloves

Seventeen types of industrial protective glove are specified in this revision of BS 1651, offering protection against the majority of industrial hazards to which the hands are vulnerable.

Materials for the gloves fall into four groups: leather, plastics, rubber and cotton. Because of the continual advances being made no reference is made to gloves made from synthetic rubbers other than chloroprene or to fabrics made from man-made fibres, and it is hoped to include these in later revisions of the specification.

The 46-page publication specifies design particulars, size, and detailed dimensions. Also are specified requirements for materials and their testing. The construction of the gloves is fully dealt with, illustrations being used to amplify the text where necessary.

Microchemical Apparatus

Micro-analysts will be interested to learn that BSI has published Revisions of Parts B2, D3 and H1 of BS 1428, 'Microchemical Apparatus.'

In BS 1428: Part B2, 'Ammonia Distillation Apparatus (Markham),' the dimensions of the condenser have been brought into line with those specified in BS 1848, 'Glass Condensers,' and notes on the method of use of the apparatus have been provided for the first time.

Special features of the revision of BS 1428: Part D3, 'Micro-nitrometer (Pregl Type),' are an increase in the length of the nitrometer and the inclusion of notes on the method of using the apparatus.

The standard specifies the size, material, design and dimensions of the micro-nitrometer, the tolerance on capacity and details of the graduation lines and other inscriptions.

The revised edition of BS 1428: Part H1, 'Weighing Vessels for Micro-chemical Analysis,' contains requirements for two extra sizes of weighing bottles with ground stoppers; and the lengths and weights of the weighing pigs and tubes have been reduced. The latter change has not decreased the capacity of the vessels, since ground glass caps are now specified in place of stoppers.

The vessels now specified in the standard are: Three weighing bottles with ground stoppers; a weighing pig with ground cap for use with a micro-combustion boat; long-handled weighing tubes with and without ground cap; and a weighing tube with two ground caps for use with hygroscopic substances in the micro-determination of carbon and hydrogen by combustion.

The address of the British Standards Institution Sales Branch is 2 Park Street, London, W.1

Mr H. F. Spencer has resigned from the Board of RFD Company because of pressure of other duties.

Rubber Statistics

UNITED KINGDOM — SARAWAK — NORTH BORNEO

THE latest details of the UK's rubber position as shown by the Secretariat of the International Rubber Study Group in their monthly bulletin, bring the available data up to the end of February last.

Imports of natural rubber during the first two months of the year totalled 24,751 tons of crude and 5,795 tons of latex, the total, 30,546 tons, being some 6,000 tons below the import figure for the first two months of last year. At the same time, however, 12,169 tons were delivered from the stockpile, and, after allowing for exports, there remained a new supply available for consumption of 35,747 tons, in this case an increase of about 5,000 tons compared with last year.

Consumption of natural rubber during these two months amounted to 25,425 tons of crude and 3,639 tons of latex, while stocks of natural at the end of February stood at 17,011 tons of crude and 5,484 tons of latex, or some 22,500 tons in all; a year previously, natural rubber stocks had totalled 33,825 tons, or some 50% more.

Production of synthetic rubber during these months totalled 11,089 tons, while a further 9,028 tons were imported. After allowing for exports, there remained an available new supply of 18,387 tons, compared with which actual consumption amounted to 16,884 tons. A year previously, consumption had only amounted to 11,544 tons over this period. Stocks of synthetic at the end of February totalled 9,256 tons, a reduction of some 3,000 tons compared with a year previously.

Reclaim production during the first two months of the year totalled 7,661 tons, while 2,149 tons were exported during the same period. Consumption during the period amounted to 6,136 tons, and stocks at the end of February stood at 2,165 tons.

Sarawak

The Study Group has now issued details of Sarawak's rubber exports during the first quarter of the year.

These totalled 12,583 tons, having amounted to 8,109 tons during the first quarter of last year. Singapore was the main destination for these exports, taking 9,035 tons, while Japan came second with 2,975 tons. Of the remainder, Hong Kong took 553 tons.

North Borneo

The Study Group has also published details of North Borneo's rubber exports during the same period.

These amounted to 5,554 tons, compared with the 1959 figure of 5,673 tons. Once again, Singapore was the main destination, taking 2,145 tons of this rubber and was again followed by Japan which took 1,547 tons. Other countries to take appreciable quantities included the United Kingdom (738 tons), Italy (311 tons) and Hong Kong (230 tons).

Instant Pipes

Construction machinery that is said to build 'instant concrete pipe' in a freshly-cut ditch at a rate of 8 to 12ft. a minute has been developed by Fullerform Continuous Pipe Corp., in USA.

Inflatable rubber and fabric forms, designed by Goodyear Aircraft Corp. engineers, from blimp-type materials, are part of the continuous-operation system. Inventor of the process said the equipment eliminates joints and seams, cuts construction time and overall costs.

Using two 300ft. inflated forms with only three psi air pressure, Fuller can pour as much as 600ft. of concrete pipe at a time without interruption. It is possible to line up forms for runs in miles. Readymix concrete trucks are used in a continuous stream to service the pouring equipment.

F. E. Winstanley, of Greengate and Irwell, has been re-elected chairman of the British Association of Balata Belt manufacturers.

RUBBER IN ASPHALT

A better national highway system at lower ultimate cost was possible through the use of rubber additives in asphalt paving materials, claimed research chemists of Goodyear Tire and Rubber Co. at a symposium on 'rubber in asphalt' held in USA. Actual road tests are said to have proved the benefits of adding rubber to asphalt for both hot mix asphaltic concrete and seal cost construction. Physical properties of aspahlt paving materials are greatly improved by rubber. This results in greater elasticity, ability to withstand fluctuating weather conditions and longer wearing road surfaces.

Goodyear's experience with rubber in paving materials dates back to 1925, when the company surfaced a section of one of Ohio's busiest streets with rubber paving blocks. This pavement is still in excellent condition today.

The Board of Trade have reappointed Sir Laurence Merriam, chairman of the British Xylonite group, as chairman of the Furniture Development Council.

Book Review

POLYTHENE: THE TECHNOLOGY AND USES OF ETHYLENE POLYMERS.—Second Edition. Edited by A. Renfrew and Phillip Morgan. (London: Iliffe and Sons Ltd., 1960, pp. xxi-718—93 pp. of plates. 165s. net.)

Since the first edition of this book was published in 1957, developments in the technology and uses of polythene have been so rapid that the original text has been largely rewritten, particularly with regard to the high density materials, and nearly 300 pages have been added. The most important additions are as follows: the chapter 'Manufacturing Processes' now appears as four sections each dealing with one of the main manufacturing methods, high pressure, Ziegler, Phillips, and Standard Oil Co. polymerization; the polymerization reaction is dealt with in two chapters, one on free radical the other on ionic growth polymerization; a new chapter deals with the rapidly growing field of copolymers and blends of polymers; vacuum forming; reprocessing; and two chapters on packaging outlets other than film.

Appendices give a list of world manufacturers and their production capacities, and proprietary names for ethylene polymers, and an authors' index is included in addition to the subject index.

So great, in fact, are the changes that this may be regarded as a new and larger book rather than a second edition.

Contributions are included from 53 experts drawn from Great Britain, the United States, Germany, Holland and Switzerland, and the book is an exhaustive and comprehensive survey of the facts of polythene production, properties, processing and handling techniques, and major uses.

World production of polythene is already in excess of one million pounds a year, and this is the fastest growing section of the plastics industry, so polythene may rightly be considered as one of the most important basic materials. This book therefore should be a valuable reference work for a very large number of plastics technologists and others connected with the many industries where polythene is assuming an important role.

British Belting and Asbestos Ltd., Cleckheaton, have made new appointments to the board of directors. They are P. H. A. Mount (Mintex division sales manager); D. M. Pearson (Mintex division works manager); J. H. Fenton (personnel manager) and C. M. Fenton (asbestos division works manager).

PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Elastic Yarn and Cord

No. 827,642. American Viscose Corporation. Application and Filed, March 26 1956. Application in USA, April 18 1955. Published, February 10 1960.

A solution of natural or synthetic rubber in a volatile solvent is sprayed upwardly through spray tips into a tower. The spray tips are surrounded by projecting nozzles through which a primary stream of gas such as air is passed at a velocity appreciably higher than the velocity at which the rubber solution emerges from the spray tips. The single continuous stream of rubber solution emerging from each spray tip is attenuated and broken transversely into rubber fibres of various lengths by the stream of gas. A secondary stream of gas such as air is directed upwardly through the tower to form a vortex which carries the rubber fibres towards the axis of the tower, and as the fibres come into contact with each other they become bonded together. By continuously withdrawing the collected bundle of rubber fibres from the top of the tower, the fibres are deposited in a progressive overlapping arrangement to form a rubber strand. Textile fibres or particles of solid material, such as cork dust or wood flour, may be introduced into the primary gas stream and thus become incorporated in the rubber strands. In an alternative arrangement, the rubber fibres are collected on a preformed wire, cellulose fibre yarn or thermoplastic filament. The rubber solution contains vulcanizing ingredients and any other compounding ingredients as desired, the rubber strand being vulcanized by heat.

Weatherstrip may be made by embedding the marginal edge of a strip of woven textile fabric into the rubber strand prior to vulcanization, covering the whole with a layer of unvulcanized rubber and then vulcanizing the assembly.

Cellular Polythene

No. 828,739. British Insulated Callender's Cables Ltd. Inventor: R. M. Black. Application, June 17 1957. Filed, June 17 1958. Published, February 24 1960.

Polythene is expanded to cellular form by raising the temperature of the polythene to a value approaching its softening point and then subjecting it to ionizing radiation. The energy absorbed by the polythene during irradiation raises its temperature, and the temperature to which the polythene is pre-heated is so chosen that the energy absorbed causes the polythene to reach a temperature such that gas cells of the desired average size are formed in it. Any form of ionizing radiation having an energy sufficient to cause hydrogen evolution can be used, but it is preferred to use high energy electrons because of the facility with which the beam energy can be controlled to obtain the desired effect. This method of expanding polythene is particularly useful in the manufacture of insulated wires and cables since a layer of polythene can be expanded while *in situ* on the conductor.

Elastomeric Addition Products

No. 828,814. The Goodyear Tire and Rubber Co. Application and Filed, July 9 1956. Application in USA, October 28 1955. Published, February 24 1960.

Elastomeric addition products are made by reacting an aliphatic monomercaptan containing from 1 to 6 carbon atoms, such as methyl mercaptan, with a synthetic rubber latex. The synthetic rubber latex contains an emulsion-polymerized conjugated diolefin having from 4 to 6 carbon atoms, *e.g.* polybutadiene, or a copolymer of such a diolefin with a vinyl or vinylidene monomer, *e.g.* SBR or nitrile rubber. The addition product is isolated by coagulation and may be blended with natural rubber, reclaimed rubber or synthetic rubber. It may be oil-extended when in latex form.

The addition products are valuable for the manufacture of tyres, inner tubes, coated fabrics and industrial rubber products. They provide improved dynamic properties, as measured by high resilience and low heat build-up, and improved resistance to oxidation and ozone cracking.

Shorter Abstracts

Fluoroethylene Copolymers. 827,308. Minnesota Mining and Manufacturing Co. Filed, November 22 1956.—Copolymers of tetrafluoroethylene and vinylidene fluoride are claimed. The copolymers are resistant to 650°F. for prolonged periods.

Collapsible Barges. 826,301. Esso Research and Engineering Co. Filed, July 14 1958.—A collapsible barge for holding a liquid of density less than water is provided with a keel comprising a collapsible bag fixed to the main container forming the barge, the collapsible bag being adapted to be filled with water.

Vinyl Halide Resin Compositions. 827,986. Union Carbide Corporation. Filed, October 1 1956.—Diepoxides of a specified general formula are claimed as plasticizers for PVC and vinyl halide copolymer resins. The diepoxides also serve as stabilizers against the effects of heat and light.

Electrically Conductive Composition. 828,233. British Insulated Callender's Cables Ltd. Filed, October 29 1957.—An electrically conductive composition comprises a processed mixture of 35 to 77% of polythene, 5 to 45% of polyisobutylene and 10 to 23% of a conductive carbon black. The compositions bond easily to polythene.

Stabilization of Polythene. 826,262. Chemische Werke Hüls AG. Filed, October 7 1957.—Polythene and other hydocarbon polymers and copolymers are stabilized against the action of heat, oxygen and light by incorporating in the polymer a small proportion of a dianil of a specified general formula.

Eight colour experts from Germany recently toured Canada and USA. Here, Dr Andreas Brockes (*left*), head of the colorimetry laboratory of Farbenfabriken Bayer, examines an organic pigment in the New Jersey plant of Allied Chemical, which supplies a wide range of pigments for plastics. With him is Dr Manfred Richter, of the German Board of Testing Materials

Rubber Markets

LONDON

A quiet market was noted prior to the Whitsun recess, with dealings mostly confined to 'squaring' of accounts. As sellers were chary in offering, the undertone was firm. Easier conditions ruled on the resumption of trading after the holiday, this partially reflecting lower levels at Singapore. Factory demand was restricted by the holidays.

Latest prices are as follows:

No. 1 RSS Spot: 38d.-39d.

Settlement House:

July 37d.-37¼d.
August 35⅝d.-35⅞d.
September 35d.-35¼d.
July/September 36d.-36¼d.
October/December 34⅛d.-34⅜d.
January/March 33⅛d.-33⅜d.
April/June 32⅛d.-32⅜d.

No. 1 RSS cif basis ports:

June 35¼d.-36d.
July 35⅝d.-35⅞d.

Godown:

June 122¼ cents nominal.

LATEX

Centrifuged latex per gallon in drums, seller, June 20s. 6d., July 20s. 11d., cif European ports, Spot, seller, 21s. Bulk, not quoted. Creamed, seller, June-July 20s. Normal, seller, June 16s. 6d.

SINGAPORE

The market ruled dull throughout the morning of June 6. Business was confined to No. 1 RSS and some small covering for No. 2 and No. 3 RSS. Factories were quiet. Most up-country centres were closed in the afternoon and the market continued quiet. Some interest was shown in No. 3 sheet. Factories were out of the market. After hours, the market was quiet. No. 1 June buyers was a quarter of a cent above the previous final levels at 126 Malayan cents per lb.

Malayan cents per lb., fob Malayan ports to open ports

	Close	Previous Close
No. 1 RSS, June	126 –126½	125⅝–126
July	125 –125½	124⅝–125⅝
No. 2 RSS, June	123½–124½	124 –125
No. 3 RSS, June	119½–120	119⅝–120⅜
No. 4 RSS, June	115½–116½	115⅝–116⅜
No. 5 RSS, June	112 –113½	112 –113
No. 1 RSS, Spot	126½–127½	126⅜–127⅛
No. 3 blanket, thick remilled crepe, June ..	112½–114½	112½–114½
No. 1 fine pale crepe, June ..	130½–131½	131 –133
2X thin brown crepe, June ..	113 –114	112½–113½

Tone: Quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 238.00d. per gallon.

NEW YORK

The New York rubber market ruled as under on June 6:

DEALERS' PRICES

US cents per lb. Ex-dock

	June 6	Previous
No. 1 RSS, June..	44a	44a
July ..	42¾a	42¾a
No. 2 RSS, June..	43¼a	43¼a
July ..	42¾a	42¾a
No. 3 RSS, June..	43¼a	43¼a
July ..	43¼a	43¼a
No. 1 RSS, Spot..	44¼a	44¼a
No. 3 amber blanket, crepe, Aug.	40¼n	40b–40¼a
No. 1 latex, thin crepe, June ..	45b	45b
No. 1 latex, thick crepe, June ..	44¾n	44¾n

FUTURES—REX CONTRACT

	June 6	Prev. Close
July ..	43.70t	42.92b–43.00a
Sept. ..	41.60t	41.25b–41.33a
Nov. ..	40.55t	40.37t
Jan. ..	39.60b–39.90a	39.60b–39.90a
March ..	38.85b–39.15a	38.85b–39.10a
May ..	38.25b–38.50a	38.20b–38.50a
July ..	37.60b–37.90a	37.40b–37.70a

Sales: 63. Tone: Very steady.

Rubber futures were firmer on June 6, particularly the July position which was up about half a cent per lb. on covering. Dealings were moderately active. Traders said that physical rubber was quiet. The undertone of the physical market was steady.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on June 6 was 39.00 US cents per lb.

CEYLON

No. 1 RSS

The price of No. 1 RSS at Colombo on June 6 was 149 Ceylon cents per lb.

DJAKARTA

The market was at a standstill on June 7. The close was dull.

Rupiahs per kilo

	June 7	Previous
Spot No. 1 Priok ..	53.50b	54.25b
Spot No. 2 Priok ..	52.50b	53.00b
Spot No. 3 Priok ..	46.50b	47.00b
No. 1 fine pale crepe, spot	45.00b	46.00b

Tone: Dull.

AMSTERDAM

The Amsterdam rubber market ruled as under on June 7:

Guilders per kilo

No. 1 RMA	June 7	Previous
June	3.59	3.59
July	3.56	3.56
August	3.55	3.55
September	3.54	3.54
July/September ..	3.55	3.55
October	3.38	3.38

Sales: 15. Tendency: Quiet.

COMPANIES in the NEWS

Johnson and Phillips

Johnson and Phillips is not paying an ordinary dividend for 1959, against 5%, but is making a distribution from capital profits of 3% (nil), not subject to tax.

A loss of £144,084 was incurred, against a profit of £21,397, after tax of £53,000 (£58,000).

BASF

The report presented at the annual general meeting of Badische Anilin und Soda-Fabric AG showed that, as in previous years, the plastics part of the company's production programme expanded to a greater extent than others. A pilot plant for the manufacture of several thousand tons a month of ethylene, propylene, butylene and butadiene on the basis of crude oil was taken into service without a hitch. This process, developed at Ludwigshafen, is hoped to provide easy access to the most important petrochemical elements. A similar development is expected in the case of acetylene.

The foamable polystyrene Styropor continued its advance, the report said, and production installations for this material will be further extended during the next few years.

The production capacity for Lupolen was again stepped up considerably to almost 50,000 tons a year, and turnover rose accordingly. For the first time, rigid polythene, produced in a low-pressure process, became available.

The report cites the progress made by a number of associated companies, including Dow Badische; the first production plant of this company, producing acrylic acid, came into service at the end of 1959. Rheinische Olefinwerke GmbH, in which BASF has a 50% interest, completed installations for the manufacture of high-pressure polythene, and the plant manufacturing low-pressure polythene came on stream as scheduled.

Net profit for the group for 1959 was more than DM101m.

Canadian Consumption

Rubber consumption in Canada increased in the month of March to 10,569 long tons (10,136 in corresponding period of last year). Consumption of natural rubber amounted to 3,507 tons (3,571); synthetic rubber 5,365 tons (4,963) and reclaimed 1,697 (1,602).

For the first three months of this year, consumption of all rubber amounted to 30,654 tons (29,630). Natural rubber consumption in the period amounted to 10,418 long tons (10,618), synthetic 15,325 (14,530) and reclaimed 4,811 (4,482).

Industry INTELLIGENCE

Technical Data

Rubber Fillers

Information is given on three white fillers for rubber and other materials in Hi-Sil bulletins Nos. 2 and 4, and Calcene bulletin No. 3, issued by Columbia Southern Chemical Corporation, 1 Gateway Center, Pittsburgh 22, PA.

Hi-Sil X303 is a high purity fine particle size silica, especially effective as a reinforcing filler for silicone rubber stocks, in which it provides a very good level of reinforcement, easy processing and low water absorption. X303 also shows promise in various plastics applications, paint, varnish and lacquer, greases, inks, textile treatments, cosmetics and pharmaceuticals.

Hi-Sil 233 has similar properties and uses and is also finding applications as a carrier and diluent for insecticides and agricultural chemicals, and for various anti-caking and viscosity control purposes.

Calcene CO is a fine particle, precipitated calcium carbonate pigment, surface coated to increase the ease of dispersion in rubber compounding. Its principal outlets are for the production of household goods, heels and footwear, and wire and cable insulation.

Reoplex 300

Reoplex 300 is a polyester plasticizer designed for use in cellulose nitrate surface coatings. Data for the properties of Reoplex 300 and results of comparative tests with other plasticizers in a simplified cellulose nitrate lacquer formulation are given in Technical Data Sheet No. 18, issued by The Geigy Co. Ltd., Rhodes, Middleton, Manchester.

The simplified lacquer formulation used for the tests was chosen so that (1) the effect due to variation in performance of the plasticizer could be isolated from adventitious effects and (2) a comparatively rapid breakdown and development of corrosion occurred in most cases under the conditions of weathering exposure. The tests carried out on the lacquer were as follows: (a) immersion in water, petrol and oil, (b) natural weathering for 6 months and (c) heat migration.

Manosil AS7 in SBR Compounds

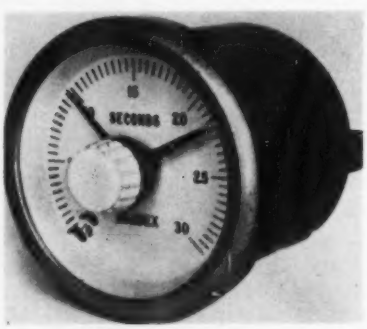
A basic study of the performance of Manosil AS7, an aluminium silicate filler, in SBR compounds, is reported in Technical Service Note No. 16 issued by Hardman and Holden Ltd., Manox House, Miles Platting, Manchester 10.

The investigation included (a) effect on processing characteristics of processing aids, zinc oxide content and mixing temperature, (b) effect of sulphur loading on the properties of the vulcanizate, (c) comparison of accelerator systems including the use of Activator R with primary accelerators, (d) effect of the use of sulphur coated with magnesium carbonate, (e) detailed test results on selected compounds and (f) use of blends of Manosil AS7 and china clay. The compounds used in parts (a) to (d) of the investigation all contained 60 parts of Manosil AS7 per 100 parts of SBR 1502. Compounds containing 60 and 80 parts of Manosil AS7 were used for part (e), both SBR 1502 and oil-extended SBR being used for the 80 parts loading. Four blends of Manosil AS7 and china clay were used in part (f), namely 30, 40, 60 and 80 parts of AS7 with 50, 60, 30 and 40 parts of china clay, respectively.

Machines, Materials and Equipment

Process Timer

A new process timer (Type Imp) from Londex Ltd., has been designed to meet the need for an instrument which can offer a wide variety of contact arrangements. It is self-resetting,



can be started by a remote switch and is of medium price (below £13).

It caters particularly for repetition working and Londex say it is suitable for incorporating in control units of all types. The timer is available in two forms—flush mounting type and wall mounting type. A range is available to cover full scale times from 30 seconds with half second settings up to 24 hours with 20 minute settings.

The timer is housed in a round sheet metal casing and has a matt white dial engraved in black. It is provided with two pointers, one black and the other red. The former is set to the desired time interval, and when the unit is at rest, the red pointer is coincident with the black pointer. When the timer is operating, the red pointer moves towards zero. Thus, at any instant, it is possible to ascertain the time that still has to elapse before the end of the process, as well as the period to which the instrument had been set initially.

Over full scale an error would not be more than 1.25%. This means that with a timer having a full scale of 60 seconds the maximum deviation can only be 0.75 a second—a standard of accuracy well within usual industrial requirements.

The timer operates on 200/250v. AC 50 cycle supply, but transformers can be supplied to provide for operation on other AC voltages. The four changeover contacts provided in the unit are each rated at 2 amps 250v. AC.

New Publications

Lupolen

BASF have issued a new booklet dealing with their Lupolen grades. A wide range of products are now available varying in density from 0.918 to 0.960 for the rigid types while the melt index varies from 0.5 up to 20. Lupolen grades containing 10-50% of polyisobutylene which are resistant to stress cracking are also available together with special types for cable coating and the production of crystal clear film.

The first section of the booklet provides information concerning the chemical and physical properties of Lupolen. Thus, the thermal, mechanical and electrical properties under conditions closely related to practice are given in the form of tables and graphs. The influence of the homogeneity, the action of lubricants and stabilizers are discussed while attention is also given to the relation of the properties to the density and melt index.

The second part of the booklet describes in detail the processing and potential applications of the individual Lupolen grades. A section is also included dealing with printing, welding and other special techniques as applied to Lupolen.

Aqueous Stoving Primers

Vinamul R2929, a modified PVA emulsion with a solids content of 47.5%, has been developed as a base for aqueous stoving primers which are odourless and non-inflammable. Films of Vinamul R2929 give good corrosion resistance without the use of inhibitive pigments. A typical formulation for a red oxide aqueous stoving primer based on Vinamul R2929 is given in a leaflet issued by Vinyl Products Ltd., Butter Hill, Carshalton, Surrey.

Polymer Technology

The National College of Rubber Technology has issued its 1960/61 prospectus. Full details are given of all courses in rubbers and plastics, and side items, such as prizes, and experience that may be gained abroad are well covered.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on June 1 1960

Imperial Chemical Industries Ltd. Extrusion or organic thermoplastic materials. 836,133.

Badische Anilin- and Soda-Fabrik A.G. Polymerization of unsaturated compounds. 836,220.

Rohm and Haas G.m.b.H. Polymers. 836,046.

Distillers Co. Ltd. Copolymers of vinyl acetate with higher vinyl esters. 836,243.

British Rubber Producers Research Association. Preparation of polymeric mixtures and compounds. 836,053.

Phillips Petroleum Co. Process for recovery of polymers from solution. 836,056.

Goodyear Tire and Rubber Co. Latex treatment. 836,250.

F. Smith and Co. (Whitworth) Ltd. Extruding machines. 836,377.

Imperial Chemical Industries Ltd. Polymeric materials containing adsorbed or absorbed antibacterial compounds. 836,477.

Precision Rubbers Ltd. Resilient seals. 836,073.

Soc. Des Laboratoires Labax. Substituted coumarones. 836,272.

Monsanto Chemical Co. Textured plastic materials. 836,080.

Deutsche Gold- Und Silberscheideanstalt Vorm. Roessler. Process for the production of polymers of formaldehyde. 836,288.

Dalmine S.p.A. Process of protectively coating tubular elements, structural shapes and the like with at least one thermo-plastic resin sheath. 836,301.

Soc. Des Usines Chimiques Rhone-Poulenc. Polymerization of ethylene and catalysts therefor. 836,305.

N. W. McVicker and J. S. McVicker. Plastic modelling compositions. 836,500.

P. Beiersdorf and Co. A.G. Method of producing adhesive tapes. 836,097.

West Point Manufacturing Co. Rubber rolls. 836,324.

Esso Research and Engineering Co. High melting polypropylene. 836,333.

Pawling Rubber Corporation. Resilient mat structure. 836,334.

Dow Chemical Co. Preservation of aqueous dispersions of synthetic polymeried olefine substances. 836,335.

Farbenfabriken Bayer A.G. Hot-stretching of polyacrylonitrile yarns. 836,340.

E. I. Du Pont De Nemours and Co. Production of oriental shaped structures such as films and artificial filaments. 836,542.

De Bataafsche Petroleum Maatschappij N.V. Processes for polymerizing conjugated diolefins and to the polymerized diolefins produced thereby. 836,189.

Celanese Corporation of America. Unsaturated polyesters. 836,438.

Changes of Name

Gula-Kalumpong Rubber Estates Ltd. (109,982), 30-33 Minories, E.C.3. Name changed to Gula Investments Ltd., on November 26 1959.

Multimica (London) Ltd. (518,074), insulating material manufacturers, etc., North End Road, Wembley, Middlesex. Name changed to Mytra Materials Ltd., on December 14 1959.

Batteritio Ltd. (633,850), 166 Downhills Park Road, N.17. Name changed to Precise Plastics (Tottenham), Ltd., on December 9 1959.

Solution to RJIP Crossword

(See page 908 this issue)

ACROSS: 8, Inner. 9, Gravity. 10, Fluorine. 11, Mull. 13, Pater. 15, Armadas. 16, Reclaim. 19, Tired. 21, Foil. 22, Scrubber. 26, Inflate. 27, Sheet.

DOWN: 1, Tiff. 2, Insult. 3, Brer. 4, Uganda. 5, Par. 6, Liquid. 7, Cyclised. 12, Omit. 13, Paraffin. 14, Real. 17, Chiefs. 18, Mickey. 20, Rubber. 23, Uist. 24, Rate. 25, Wax.

NEW COMPANIES

Parkers of Brixton Ltd. (657,551). — April 27. Capital: £100 in £1 shares. To carry on the business of importers, exporters, buyers and sellers of and dealers in goods of all kinds, etc. The directors are: Sydney S. Parker and Michael A. Parker, both of 13 Valley Drive, Kingsbury, N.W.9. Reg. office: 39 Wykeham Road, N.W.4.

L.J. Imports Ltd. (657,708).—April 28. Capital: £1,000 in £1 shares. The directors are: Llewellyn W. Jones and Mrs. Dorothy M. Jones, both of 15 Nassington Road, N.W.3. Reg. office: 65 Fleet Road, N.W.3.

Cowans Fabrics Ltd. (657,510).—April 27. Capital: £10,000 in £1 shares. To carry on the business of shopkeepers and market stallholders, manufacturers of and dealers in textiles, fabrics and plastic materials of all kinds, etc. Sidney Cowan, Oregon House, Adbolton Grove, W. Bridgford, Nottingham, signs as director. Reg. office: 5 New Street, Boston, Lincs.

Powrmatic Ltd. (657,482). — April 27. Capital: £10,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in heat raising plant, oil burners and accessories, electrical appliances, plastic goods, etc. The first directors are to be appointed by the subscribers. Reg. office: 40 Portland Place, W.1.

Alfred Friedman Ltd. (657,584). — April 23. Capital: £500 in £1 shares. To carry on the business of manufacturers of and dealers in goods of all kinds made from glass, metal, stone, bakelite, rubber, etc. The directors are: Alfred Friedman and Mrs. Lysa Friedman, both of 82 Norroy Road, S.W.15. Secretary: Mrs. L. Friedman. Reg. office: 12 Hillside Avenue, Wembley, Middlesex.

East Peckham Mouldings Ltd. (657,633). —April 28. Capital: £1,000 in £1 shares. To carry on the business of plastic manufacturers, moulders, etc. The directors are: Frank E. Stacey, Grange Cottage, Carpenters Lane, Hadlow; Thomas K. M. Harlow, Addlestead Farm, East Peckham; Mildred F. S. Harlow and William F. Stacey. Solicitors: F. B. Jevons, Riley and Pope, Tonbridge.

Southern Engineering Co. Plastics (Lancing) Ltd. (657,660). — April 28. Capital: £4,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastic, modelling and moulding materials etc. The directors are: James Kerr and Mrs. Irene M. Kerr, both of 55 Southdown Road, Portslade. Reg. office: 70 Church Road, Hove 3.

R·J·I·P· CLASSIFIED ADVERTISEMENTS

Classified Advertisements may be displayed under each heading at £3 per inch, single column. Write or phone for details.

MISCELLANEOUS

6d. a word, Minimum 12/6 Box 2/-

SCISSORS, up to 7in., ground and set by London cutlers established over 100 years; 48 hours postal service, 1/6 per pair.—J. A. Fowler, 18/22 Bell Street, Edgware Road, London, N.W.1. PAD 1491. (74R)

PVC extrusions for the trade.—Esco (Rubber) Ltd., 34/36 Somerford Grove, London, N.16. (80)

AGENCIES and REPRESENTATIVES

6d. a word, Minimum 12/6 Box 2/-

SALES representatives required with experience of mechanical mouldings, to cover the London area and Home Counties.—Box 316. (316)

APPOINTMENTS VACANT

THE BRITISH RUBBER PRODUCERS' RESEARCH ASSOCIATION

invites applications for a senior position in its technical service group. Applicants should have a wide experience of dry rubber technology and good technical qualifications. Salary within the principal officer grade of £1,525-£2,065 per annum, with children's allowance where applicable and superannuation under the F.S.S.U. scheme.

Applications, which will be treated confidentially, should be made to The Director of Research, B.R.P.R.A., 56 Tewin Road, Welwyn Garden City, Herts., who will be pleased to discuss all aspects of this appointment with suitable applicants. (269)

APPOINTMENTS VACANT

Reclaim Technologist

THE

NORTH BRITISH RUBBER

and

U.S. RUBBER OF AMERICA

require the services of a well-experienced reclaim technologist, aged 25-45, for their Edinburgh factory. Applicants must have good practical experience in the reclaiming of natural and synthetic rubbers by digester and oil heater processes and the compounding and testing of reclaim to meet specifications. A qualification in chemistry would be an advantage. The selected candidate will be offered an attractive salary.

Company benefits include a contributory superannuation scheme and free life assurance. The company are also prepared to assist with removal expenses.

Applications marked R giving full details of age, experience and qualifications should be addressed to Industrial Relations Division, The North British Rubber Co. Ltd., P.O. Box 47, Castle Mills, Edinburgh, 3.

(323)

DESIGN draughtsman required by engineers manufacturing paper converting machines and hydraulic rubber and plastic presses. Applicants should have sound mechanical experience and/or hydraulic knowledge. Pension scheme in operation.—T. H. Dixon and Co. Ltd., Letchworth, Herts. (324)

REQUIRED rubber and plastics calender charge hand for 68in. 3-bowl modern calender. Must be fully experienced in frictioning heavy canvas materials and sheeting both rubber and plastic. High rate paid to first-class operator. Write giving full details of experience. Position is in South London area.—Box 321. (321)

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(talented)

Are you interested in working with little supervision in extremely well equipped modern laboratories for a company with active international associates? Can you accept a growing responsibility on special investigations calling for creative imagination, high intelligence and an analytical mind?

If you're ready to move ahead Evode Ltd. of Stafford offer an unusual opportunity to a young graduate, aged 23-30. Your work will include investigations into the field of adhesives and other materials covering a wide technological aspect. Previous experience not essential, but we should prefer you to have some knowledge of the rubber or plastics field. Evode is a fast-growing concern, and your ability should lead us to believe that you will, with further experience, assume a major responsibility in this field. Salary is substantial. Your existing holiday requirements will be honoured.

Write, briefly, in the first instance to Dr. Simon, our Managing Director. Your letter will be treated in absolute confidence.

EVODE LTD., COMMON ROAD, STAFFORD. (313)

APPOINTMENTS VACANT

CHEMIST/TECHNOLOGIST

Chemist/technologist required, London area, by successful and prosperous old-established manufacturer. Applicant must be capable, responsible and well versed in general manufacturing, and prepared to work at the outset energetically and for long hours, assisting in re-organization and expansion that is necessary, due to the heavy and growing demands for the company's products. Salary commensurate with applicant's experience and ability, but would be a minimum of £3,000 per annum, with pension scheme. Assistance in finding housing accommodation would be accorded.—Replies to Box 297. (297)

Rubber Technologist

THE

NORTH BRITISH RUBBER

and

U.S. RUBBER OF AMERICA

have an interesting vacancy for a well-qualified and experienced rubber technologist at their Edinburgh factory. Applicants aged 30-40 should have had experience of mechanical products and be able to work on own initiative in carrying out development work to production stage. The position offers excellent prospects for advancement, and salary offered will be in line with the responsibility involved.

Company benefits include a contributory superannuation scheme and free life assurance. The company are also prepared to assist with removal expenses.

Applications marked RT giving full details of age, experience and qualifications should be addressed to Industrial Relations Division, The North British Rubber Co. Ltd., P.O. Box 47, Castle Mills, Edinburgh, 3.

(322)

MACHINERY FOR SALE

6d. a word. Minimum 12/6. Box 2/-.

BLACKFRIARS 24 x 12 rotary cutter with 20 h.p. motor and starter. One complete set of spare knives, together with pneumatic take-off equipment, vibratory screen and steel staging. The above comprehensive equipment is in excellent condition and is available immediately. Price complete £800. Ex works.—Box 325. (325)

MACHINERY FOR SALE

RUBBER PLANT FOR SALE

Double Geared RUBBER MILL by **Francis Shaw & Co. Ltd.** Rolls 18" x 27½" dia. x 60" long, arranged for steam heating and water cooling. Hand screw adjustment to rolls. Driven through spur gearing and reduction gearbox by 100 h.p. slipring motor running at 730 r.p.m. Complete with hand-operated starter suitable 440 volt, 3-phase, 50 cycles supply. Mounted on Vibro mounted rolled steel baseplate and complete with Lunn type safety gear, tray, guards.

Double Geared RUBBER MILL by **Francis Shaw & Co. Ltd.** Rolls 16" dia. x 48" long, arranged for steam heating and water cooling. Hand screw adjustment to rolls. Driven through spur gearing and reduction gearbox by 60 h.p. slipring motor running at 960 r.p.m. Complete with starter suitable 400/440/3/50 supply. Machine fitted Lunn type safety gear, guards and tray.

Double Geared RUBBER MILL by **Francis Shaw & Co. Ltd.** Rolls 16" dia. x 48" long, arranged for steam heating and water cooling. Hand screw adjustment to rolls. Driven through spur gearing and reduction gearbox by 50 h.p. slipring motor. Complete with starter suitable 400/440/3/50 supply. Machine fitted Lunn type safety gear, guards and tray.

20" x 16" x 48" double geared RUBBER MILL by **Joseph Robinson.** Chilled cast rolls, front roll 20" dia. x 48" long, rear roll 16" dia. x 48" long, cored for steam heating or water cooling with trunnion connections. Friction ratio 1.3 to 1. Doctor knife to rear roll. Mill driven through overdriven reduction gear from 40 h.p. motor. 400/3/50. Electro-magnetic braking system.

Single Geared RUBBER MILL by **David Bridge.** Rolls 42" long x 18" dia., arranged for steam heating and water cooling. Doctor knives fitted to both rolls operated through worm gearing. Hand screw adjustment to rolls. Friction ratio 1.19 to 1. Mill is driven by means of 75 h.p. slipring motor by **Laurence Scott and Electro Motors** suitable for 440 volts, 3-phase, 50 cycles supply, running at 735 r.p.m. Motor is complete with Ellison starting equipment. Drive through spur gear and fan cooled reduction gear. Fitted with Lunn type plug braking.

36" x 12" Single Geared RUBBER MILL by **Berstoff,** driven from 40 h.p. G.E.C. motor 935 r.p.m., 400/440/3/50 through reduction gear unit, double helical gearing with electro-magnetic brake incorporated. Front roll adjusted by separate hand screws with breaker pads. Roll and pinions are machine cut 22T and 18T giving friction ratio of 1.22.

EXTRUDING MACHINE by **Iddon Brothers** for P.V.C. wire covering. 12 h.p. British-Thomson Houston induction motor 400/3/50 supply. Drive through vee-belts and three-speed gear reduction box, screw speeds 17.5 r.p.m., 25.5 r.p.m. and 35.5 r.p.m. Length of extruding chamber barrel 3' 8". Arranged for oil heating by 16 kW oil heater circulating unit. Maximum working temperature 500 degrees F. Maximum speed up to 20 yds. per minute. New 1953/4.

Vertical Jacketted VULCANISING PAN by **General Eng. Co. Ltd.** 6' internal dia. x 6' deep on the straight, overall height 9' 10". Bayonet type lid with raising and lowering gear. Working pressure of vessel and jacket 70 p.s.i.

Horizontal Unjacketted VULCANISING PAN. 4' dia. x 15' long, bayonet type door. Working pressure 75 p.s.i. Internal rails and two bodies.

Four Pillar type '**Northampton**' REVOLUTION PRESS with working table 6' 9" x 14" x 14" 5 h.p. Crompton Parkinson squirrel cage motor and vee-belt drive to cone type friction clutch. 400/440/3/50.

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(320)

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600

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376 c.f.m. BELLISS & MORCOM 125 p.s.i.

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169 c.f.m. INGERSOLL RAND 100 p.s.i.

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Stanningley, Nr. Leeds
(Pudsey 2241) (309)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

TEN-INCH Bridge strainer with 175 h.p. drive. 4½in. Iddon strainer extruder. 2in. Shaw plastics extruder with wire covering head.—Reed Brothers (Enginering) Ltd., Replant Works, Woolwich Industrial Estate, London, S.E.18. Tel.: Woolwich 7611 (6 lines). (326)

ARTICLES WANTED

6d. a word, Minimum 12/6 **Box 2/-**

MELLOR Equipment Ltd., Springfield Lane, Salford, 3, buy used machinery of Francis Shaw and Joseph Robinson manufacture.—Telephone: Manchester, Blackfriars 1866. (271)

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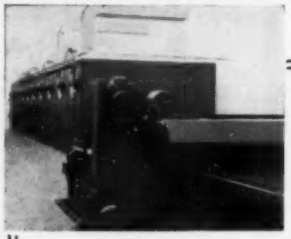

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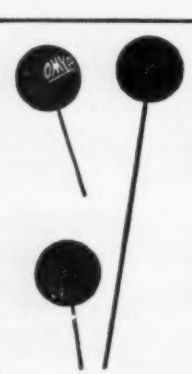

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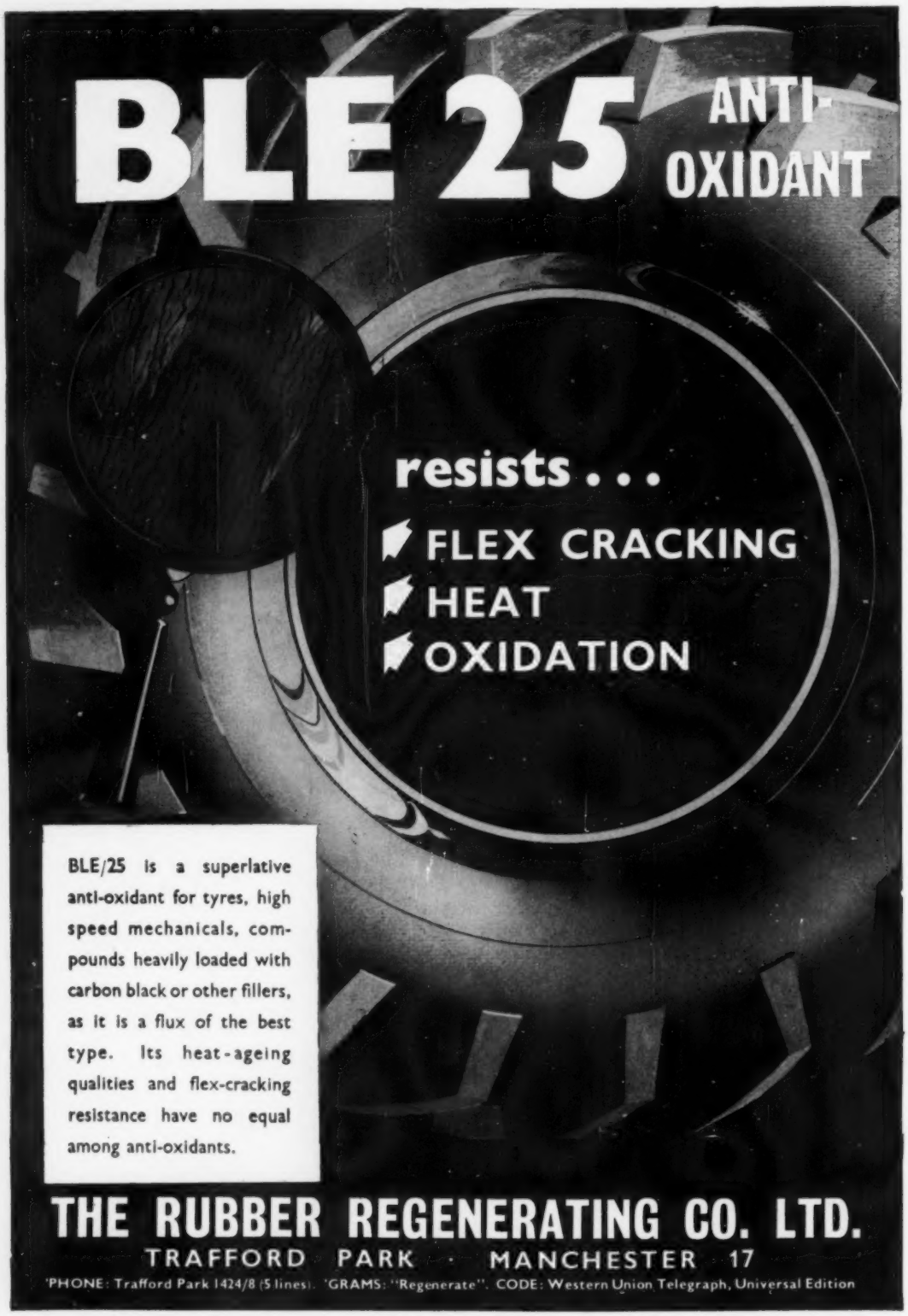
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